Report and Proceedings

OF THE

BELFAST

NATURAL HISTORY & PHILOSOPHICAL SOCIETY

FOR THE

SESSION 1901-1902.

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PRINTED BY ALEXR. MAYNE & BOYD, 2 CORPORATION STREET
(PRINTERS TO QUEEN'S COLLEGE.)

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Belfast Natural History and Philosophical Society.

ESTABLISHED 1821.

SHAREHOLDERS.

1 Share in the Society costs £7.
2 Shares ,, costs £14.
3 Shares ,, costs £21.

The Proprietor of 1 Share pays 10s. per annum ; the proprietor of 2 Shares pays 5 shilllngs per annum ; the proprietor of 3 or more Shares stands exempt from further payment.

Shareholders are only eligible for election on the Council of Management.

MEMBERS.

There are two classes—Ordinary Members who are expected to read Papers, and Visiting Members who by joining under the latter title, are understood to intimate that they do not wish to read Papers. The Session for Lectures extends from November in one year till May in succeeding one. Members Ordinary or Visiting, pay £1 1s. per annum, due 1st November in each year.

Each Shareholder and Member has the right of personal attendance at all meetings of the Society, and of admitting a friend thereto; also of access to the Museum and Library for himself and family, with the privilege of granting admission orders for inspecting the collections for any friend not residing in Belfast.

Any further information can be obtained by application to the Secretary. It is requested that all accounts due by the Society be sent to the Treasurer.

The Museum, College Square North, is open daily from 10 till 4 o'clock. Admission for Strangers, 6d. each. The Curator is in constant attendance, and will take charge of any Donation kindly left for the Museum or Library.

Belfast Natural History and Philosophical Society.

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ANNUAL REPORT, 1902.

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The Annual Meeting of Shareholders of the Society was held on 3rd July, in the Belfast Museum, College Square North. Mr. John Brown, F.R.S., President, occupied the chair, and amongst those present were—Messrs. R. Lloyd Patterson, D.L.; R Patterson, F.Z.S., M.R.I.A.; John Horner, M.I.M.E.; Joseph Wrigh, F.G.S.; W. Swanston, F.G.S.; S. F. Milligan, M.R.I.A.; W. Gray, M.R.I.A.; R. Dod, J.P.; Conway Scott, C.E.; J. E. Magill, A. Kinnaird, William Faren, Isaac W. Ward, and Davys Bowman.

The Hon. Secretary (Mr. Robert M. Young, B.A.) read the Annual Report which contained the following :—

The Winter Session was opened in the Museum on 10th December, 1901, when an address was kindly given by Mr. Francis C. Forth, Assoc. R.C.Sc.I., Principal of the Municipal Technical Institute, Belfast; subject—"The Municipal Technical Institute, its Aims and Aspirations."

The Second Meeting was held on 6th January, 1902, when Mr. Joseph Barcroft, M.A., Fellow of King's College, Cambridge, gave a lecture on "Respiration," illustrated by experiments.

On the 4th February the Third Meeting was held, when Mr. John M'Kean contributed "Notes on Local Survivals of Ancient Harvest Customs," with specimens ; and Mr. John

J. Marshall lectured on "The Northern Blackwater: its Scenery, Antiquities, and Battlefields," illustrated by special lantern views.

The Fourth Meeting was held on 5th March, when Mr. Seaton F. Milligan, M.R.I.A., gave a popular lecture, fully illustrated; subject—"The Irish Industrial Awakening." The chair was occupied, in the absence of the President, by Sir R. J. M'Connell, Bart., and the proceeds were devoted to the reduction of the debt owed by the Causeway Defence Fund.

The Closing Meeting was held on the 8th April. Mr. John L. Macassey, C.E., read a paper; subject—"The Mourne Scheme for the Supply of Water to the City of Belfast," illustrated by special lantern views.

The President also gave an account of the meeting of delegates to the British Association in Glasgow.

The meetings were less in number than usual, mainly owing to the renovation of the Museum building, which delayed the opening of the session. There was a satisfactory attendance of the members and general public at all the meetings, and several of the papers submitted were subsequently favourably referred to and discussed in the local Press. The number of societies holding their meetings in the Museum shows no diminution. As usual, the attendance of the public was very large at Easter, when the Museum was opened at a nominal charge.

As will be seen from the Hon. Treasurer's Statement oi Accounts, duly audited by the Local Government Board's Auditor, a reduction of balance has been caused by the special expenses involved in renovating the Museum premises. This will, however, be partially met by subscriptions given by members towards this purpose.

Owing largely to the zealous efforts of Mr. Robert Patterson, F.Z.S., M.B.O.U., a considerable sum has been contributed by friends of the Society with a view to place the collections of objects of natural history on a satisfactory footing. Old and worn-out examples in the Thompson collection of Irish birds will be replaced by new specimens, partly presented by local

collectors, and the balance acquired by purchase. Your council have arranged, as intimated in their last report, for the renewal where required, of other collections, including local geology, conchology, and antiquities. Everything will be completed in time for the meeting of the British Association in September next. The painting of the interior of the Museum has caused an amount of extra work in taking down such specimens as are displayed outside the cabinets, and cleaning and replacing them. This prevented, to some extent, attention being paid to other portions of the collections, not only during the improvements, but for some time after. Subsequently the revision of the MacAdam collection of local fossils has been proceeded with. This collection is an extensive one. It was accumulated at very great expense and labour by the late Mr. James MacAdam, F.G.S., and contains many specimens ot species which have been only rarely or not at all obtainable by recent geologists. It is the most complete collection of Irish cretaceous fossils ever made by one individual. Amongst many other good things the type specimen of *Loricula Macadami* has been recovered. As far as can be ascertained at present, this is unique. Your Council took advantage of the inquiry held in Belfast by the Royal Commission on University Education in Ireland to present a memorial to them on the 5th April, setting out their views on the question of the teaching of natural history in Queen's College, and advocating increased facilities in that direction. Your Council received with deep regret the announcement of the death of the Marquis of Dufferin and Ava, the only surviving honorary member of the Society. Several members of Council represented the Society at his funeral.

A list of donations to the Museum, and of the publications received in exchange from home and foreign societies, will be printed with the present report.

Your council desire to express their best thanks to the local Press for their reports of the various meetings.

The following members retire from office, and offer themselves

for re-election :—S. F. Milligan, John Brown, Andrew Gibson William Swanston, and W. H. F. Patterson.

The Hon. Secretary stated that he had received a letter from the Hon. Treasurer, who apologised for his inability to attend the meeting. The Statement of Accounts showed a balance of £16 16s. 7d. in favour of the account.

The Chairman, in moving the adoption of the report, said perhaps the most important matter contained in it was with regard to the renovation of the collections and the painting of the Museum. This was undertaken with the object of making the premises as presentable as possible in view of the approaching visit of the British Association to Belfast. Owing to the zealous efforts of Mr. Robert Patterson a considerable sum of money had been collected, but he did not think that Mr. Patterson was yet satisfied, and he would be glad to receive further donations. They would see that a beginning of the work had been made as regards the collection of birds. Unfortunately Mr. Robert Patterson was not on the council, but especially since he was devoting so much time and talent to the Museum it was very desirable that he should be on it, and if there had been an opportunity they would have been glad to have co-opted him. There was, however, still an opportunity of electing him, and they thought it best to leave the matter to that meeting. The Statement of Accounts showed that the balance had decreased, but indeed he was surprised it had not decreased more, because of the expense incurred in the renovations already mentioned.

Mr. John Horner seconded the adoption of the report.

Mr. R. Lloyd Patterson, drew attention to the paragraph in the report in which there was an allusion to the renovation of the natural history collections. This was partly the outcome of a report which he and his nephew Mr Robert Patterson, were asked to make a year ago. They had reported on the specimens, many of which were in a bad condition, and some of them worthless. After some little time the usual difficulty presented itself to the Council. That was the difficulty about

funds, as it was only with the most rigid economy they could keep their expenditure within their income. A certain member of the Society offered a donation of £10 to start a substantial fund for this work, and his nephew took up the matter energetically, and was able to raise a sum of money by which the collection of birds would be entirely renovated and a general rearrangement of the collections made, which would bring them up to date, so that by the avoidance of unnecessary duplications a large amount of space would be saved and room made for other specimens. He thought attention should be drawn to the matter, so that, in view of the approaching visit of the British Association, they should have the place in as good order as possible. He was afraid that owing to the generosity of Sir Wm. Whitla, who was defraying the cost of the erection of a Medical Institute, they would lose the Medical Society as tenants, and consequently they would lose the rents which that eminent and learned body had up to now paid to them. He expressed the hope that there would be a general "beating up" for new members and new shareholders, and that they would not experience the discomforts of a diminished income, which at the present moment was staring them in the face.

The report was unanimously adopted.

Mr. Patterson also mentioned a suggestion which had been made to him as to the desirability of holding their meetings in the afternoon instead of in the evening. This practice was followed in London and many other places.

Several members spoke against such a change being made, and, as the feeling of the meeting was evidently against it, the suggestion was not adopted.

Mr. Wm. Gray proposed that Mr. Robert Patterson be elected on the Council. He said that Mr. Robert Patterson was a young man, who had inherited the traditions of his family in the investigation of natural history, and he was one of the most active and successful, as well as most modest, member of their community.

Mr. R. Young seconded the proposition.

Mr. George Horner proposed that the five retiring members of the Council be re-elected.

Mr. R. Young seconded.

A ballot having been taken, the Chairman declared that the following gentlemen had been elected on the Council :—Messrs. R. Patterson, John Brown, William Swanston, W. H. F. Patterson, and S. F. Milligan.

Mr. Conway Scott proposed a vote of thanks to the Chairman for presiding. He congratulated him on being elected a Fellow of the Royal Society, and hoped he would be elected president of that body.

Mr. Wm. Gray, in seconding the motion, said it was a great honour to Belfast when an amateur, as their Chairman, by his original research, should obtain a distinction which some of their biggest Professors did not. They ought to be proud of their President, as he was a representative of the traditions of the old Natural History Society of Belfast, which was the first established in the kingdom seventy years ago.

The motion having been unanimously passed, the Chairman briefly returned thanks. He said he prized very much the honour which had been conferred upon him, and it was made doubly pleasing by the many kind words of congratulation that he had received, none of which he valued more than those offered by that Society.

The election of Office-Bearers for the ensuing year was then proceeded with in Committee. The following were elected :—President, John Brown, F.R.S.; Vice-Presidents, Robert Young, J.P., C.E.; William Swanston, F.G.S.; R. L. Patterson, D.L., F.L.S.; Rev. T. Hamilton, D.D., LL.D., President Queen's College ; Hon. Secretary, R. M. Young, J.P., M.R.I.A.; Hon. Treasurer, W. H. F. Patterson ; Librarian, J. H. Davies.

EDUCATIONAL ENDOWMENTS (IRELAND) ACT, 1885, 48 & 49 Vict. ch. 78.

The Account of the Council of the Belfast Natural History and Philosophical Society for the year 30th April, 1902.

Dr. **Cr.**

CHARGE.

To Balance as per last Account		£63 4 4	
,, Amounts received during the period in respect of Donations, Bequests, or other Endowments		3 10 0	
,, Amount of Subscriptions received in the year ended 30th April, 1902		110 3 0	
,, Amount of Dividends received in the year ended 30th April, 1902		16 19 9	
,, Amount of Rents received in the year ended 30th April, 1902		46 11 6	
,, Amount of Fees received in the year ended 30th April, 1902		0 7 6	
,, Amount realized by Sales in the year ended 30th April, 1902		0 1 6	
,, Amount of Miscellaneous Receipts in the year ended 30th April, 1902 (not included in the foregoing), viz:—			
Poor Rate Refunded	£0 12 6		
Entrance Fees at door at Easter	19 11 1		
,, ,, ,, during rest of year ...	18 18 2		
		39 1 9	
		£279 19 4	

DISCHARGE.

By Amount of Payments made in the year ended 30th April, 1902, under the following headings:—		
Maintenance of Premises, &c.	£51 3 0	
Rent and Taxes, &c.	28 16 4	
Salaries	103 3 2	
Printing and Stationery...	12 0 0	
Advertising	8 3 7	
Postage and Carriage	5 8 2	
Fuel and Gas	17 8 1	
		226 2 4
Other Payments, viz:—		
Insurance Premiums, £2 12s 6d, £1 19s 9d, £1 19s 9d...	6 12 0	
Auditor's Fee...	1 1 0	
Hire of Lantern	0 7 0	
Printing Report	20 3 4	
Commission on Cheques	0 0 9	
Special Expenses at Easter	6 10 2	
Subscription *Irish Naturalist*	2 2 0	
Cheque Book	0 4 2	
		37 0 5
Total Payment		263 2 9
,, Balance in favour of this Account on the 30th April, 1902		16 16 7
Total		£279 19 4

N.B.—Besides the above Balance there is a sum of £400 standing to the credit of this Account in the York Street Flax Spinning Co., Ltd., 4½ per cent. Debenture Stock.

We certify that the above is a true Account.

ROBERT M. YOUNG, Governor.

W. H. F. PATTERSON, Accounting Officer.

Dated this 16th day of May, 1902.

I certify that the foregoing Account is correct.

J. F. MAYNE, Auditor.

3rd day of June, 1902.

DONATIONS TO THE MUSEUM, 1901-1902.

From Mr. Granby Higginbotham.

Cast of a fossil brachiopod shell (*Spirifer disjuncta*) from Silurian rocks at Tintagel, Cornwall. Similar specimens are sold there as fossil butterflies.

From Representatives of Mr. J. S. Alexander, D.L.

A singular stone implement found in the River Bann, at Portglenone.

From Miss M. E. Reid.

Three butterflies from the Argentine Republic, South America.

From Miss Duffin.

A cabinet of marine and freshwater shells, minerals, etc., Native and Foreign.

From Mr. R. Welch.

A series of shells of *Limnea peregra*, var. *lacustris*, from the Bann River at Toome, also specimen of the coralline strand at Greatman's Bay, Co. Galway.

From Mrs. Coulter.

A collection of marine shells gathered near Bangor, Co. Down.

From Mr. Victor Coates, D.L.

A Royal seal which was attached to a patent.

From Mr. S. A. Stewart, F.B.S., Edin.

A number of Cretaceous fossils from Chalk and Greensand rocks of Antrim and Derry.

ADDITIONS TO THE LIBRARY, 1st MAY, 1901, till 1st MAY, 1902.

Adelaide.—Transactions of the Royal Society of South Australia. Vol. 25, parts 1 and 2, 1901.
The Society.

Basel.—Verhandlungen der Naturforschenden Gesellschaft in Basel. Vol. 13, part 2, 1901, and Sachregister, 1875-1900. *The Society.*

Belfast.—Report and Proceedings of the Belfast Naturalists' Field Club. Ser. 2, vol. 4, part 7, 1902.
The Club.

Bergen.—Bergens Museums Aarbog, parts 1 and 2, 1901. Meresfauna, part 1, 1901. Aarsberetning for 1901 ; and Crustacea of Norway. Vol. 4, parts 1 and 2, 1901, and 3—6, 1902.
Bergen Museum.

Berlin.—Verhandlungen der Gesellschaft für Erdkunde zu Berlin. Vol. 28, parts, 4—10, 1901.
The Society.

Bremen.—Abhandlungen vom Naturwissenschaftlichen Verein zu Bremen. Vol. 15, part 3, 1901, and vol. 17, part 1, 1901. *The Society.*

Breslau.—Zeitschrift für Entomologie vom Verein für Schlessiche Insektenkunde zu Breslau. New series, part 26, 1901. *The Society.*

Brighton.—Annual Report and Abstracts of Papers of Brighton and Hove Natural History and Philosophical Society, 1901. *The Society.*

Brooklyn.—Science Bulletin of the Brooklyn Institute of Arts and Sciences. Vol. 1, No. 1, 1901.
The Institute.

Brussels.—Annales de la Société Entomologique de Belgique. Vol. 45, 1901. *The Society.*

BRUSSELS.—Annales de la Société Royale Malacologique de Belgique. Vol. 35, 1901. *The Society.*

BUFFALO.—Bulletin of the Buffalo Society of Natural Sciences. Vol. 7, No. 1, 1901. *The Society.*

BUENOS AYRES.—Comunicaciones del Museo Nacional de Buenos Aires. Vol. 1, Nos. 8—10, 1901. *The Director.*

CALCUTTA.—Memoirs of the Geological Survey of India. Vol. 30, parts, 3 and 4, 1901 ; vol. 31, parts, 1—3, 1901 ; vol. 32, parts 1 and 2, 1899 ; vol. 33, part 2, 1901, and vol. 34, part 1, 1901. Also, Palæontologia Indica, new series ; vol. 1, part 3, 1901 ; and General Report for year 1900-1901. *The Director of the Survey.*

CAMBRIDGE.—Proceedings of the Cambridge Philosophical Society. Vol. 11, part 3, 1901, and part 4, 1902. *The Society.*

CAMBRIDGE, MASS.—Bulletin of the Museum of Comparative Zoology. Vol. 36, Nos. 7 and 8, 1901 ; vol. 37, No. 3, 1901 ; vol. 38, 4 Nos., 1900-1902, and vol. 39, No. 1, 1901. Also Report of the Keeper for the year 1900-1901. *The Keeper.*

CASSEL.—Abhandlungen und Bericht (46) des Vereins für Naturkunde zu Kassel, 1901. *The Society.*

CHRISTIANIA.—Forhandlinger, I. Videnskabs Selskabet I. Christiania, for year 1900. *The Royal Norske Frederiks University.*

CINCINNATI.—Reproduction Series, Bulletin No. 2 of the Lloyd Library, 1901. Mycological Series, No. 1, 1902, and Mycological Notes by C. G. Lloyd, No. 5, 1900, and Nos. 6—8, 1901. *The Messrs. Lloyd.*

COLORADA SPRINGS.—Colorado College Studies, vol. 9, 1900. *Colorado College Scientific Society.*

Columbus.—Bulletin of Ohio State University, series 5, No. 1, 1900, and series 6, No. 1, 1901.
The University.

Dantzic.—Schriften der Naturforschenden Gesellschaft in Danzig. New series, vol. 10, parts 2 and 3 1901. *The Society.*

Dublin.—Transactions of the Royal Dublin Society, series 2, vol. 7, No. 8, 1900, and Nos. 9—13, 1901; also Scientific Proceedings. New series, vol. 9, part 3, 1900, and part 4, 1901. *The Society.*

" Report of the Director of the Institutions of Science and Art, 1901; also Directory of the Royal College of Science, session 1901-1902.
The Technical Instruction Department.

Edinburgh.—Proceedings of the Royal Physical Society, 129th session, 1901. *The Society.*

Emden.—Jahresbericht der Naturforschenden Gesellschaft in Emden, 1899-1900. *The Society.*

Genoa.—Rivista Ligure di Scienze Letture ed Art. Anno 23, fasc. 2—5, 1901, and anno 24, fasc. 1, 1902.
The Society.

Glasgow.—Transactions of the Geological Society of Glasgow. Vol. 11, part 2, 1900. *The Society.*

" Transactions of the Natural History Society of Glasgow. New series, vol. 6, part 1, 1901.
The Society.

" Proceedings of the Philosophical Society of Glasgow. Vol. 32, 1901. *The Society.*

Gorlitz.—Abhandlungen der Naturforschenden Gesellschaft zu Gorlitz, vol. 23, 1901. *The Society.*

Gothenberg.—Goteborg's Kungl. Vetenskaps Och Vitterhets Samhälles Handlingar for 1898—1901.
The Society.

HAMBURG.—Verhandlungen des Naturwissenschaftlichen Vereins in Hamburg. Series 3, vol. 8, 1901, and vol. 9, 1902 ; also Abhandlungen, vol. 16, part 2, 1901. *The Society.*

IGLO.—Jahrbuch des Ungarischen—Karpathen Vereins, 28th year, 1901. *The Society.*

INDIANOPOLIS.—Proceedings of the Indiana Academy of Science for 1900. *The Academy.*

KHARKOW.—Proceedings of the Sociétié des Sciences Physico-Chimiques, of the University of Kharkow. Part 27, for 1899. *The Society.*

LAUSANNE.—Bulletin de la Société Vaudoise des Sciences Naturelles, vol. 36, No. 138, 1900, and vol. 37, Nos. 139—142, 1901. Also Observationes Meteorologiques, 1901. *The Society.*

LAWRENCE.—Bulletins of the University of Kansas. Vol. 9, Nos. 3 and 4, 1900, and vol. 10, Nos. 1 and 2, 1901. *The University.*

LEIPSIC.—Mittheilungen des Vereins für Erdkunde zu Leipzig, for 1900 ; also Wissenschaftliche Veroffentlichungen, vol. 5 and Atlas, 1901. *The Society.*

,, Sitzungberichte der naturforschenden Gesellschaft zu Leipzig, 26th and 27th years, 1899-1900. *The Society.*

LONDON.—Report of the seventy-first Meeting of the British Association, Glasgow, 1901. *The Association.*

,, Quarterly Journal of the Geological Society of London. Vol. 47, parts 2—4, 1901, and vol. 48, part 1, 1902. Also Lists of Fellows of the Society, and of the Geological Literature added to the Library in 1900. *The Society.*

,, Journal of the Royal Microscopical Society, Nos. 142—145, 1901, and 146 and 147, 1902. *The Society.*

LONDON.—Transactions of the Zoological Society of London, vol. 16, parts 2 and 3, 1901, and part 4, 1902; Also Proceedings, vol. 1, parts 1 and 2, 1901, vol. 2, part 1, 1901, and part 2, 1902.
The Society.

MADISON.—Transactions of the Wisconsin Academy of Sciences, Arts and Letters. Vol. 13, part, 1, 1901,
The Academy.

„ Wisconsin Geological and Natural History Survey. Bulletin 7, part 1, 1901. *The Director.*

MADRAS—Bulletin of the Madras Government Museum. Vol. 3, No. 3, 1901, and vol. 4, No. 2, 1901; also Catalogue of Prehistoric Antiquities, 1901, and Administration Report for 1900-1901.
The Superintendent.

MANCHESTER.—Journal of the Manchester Geographical Society. Vol. 16, Nos. 10—12; Vol. 17, Nos. 1—3, 1901; and Supplement to vol. 13, 1901. *The Society.*

„ Transactions of the Manchester Geological Society. Vol. 27, parts 1—7, 1901, and parts 8 and 9, 1902. *The Society.*

MARSEILLES.—Annales de la Faculté des Sciences de Marseille. Vol. 11, fasc. 1—9, n.d. *The Librarian.*

MELBOURNE.—Proceedings of the Royal Society of Victoria. New series, vol. 13, part 1, 1900, and part 2, 1901; also vol. 14, part, 1, 1901. *The Society.*

MEXICO.—Boletin Mensual del Observatorio Meteorologico Central de Mexico, July, 1900—July, 1901.
The Director.

„ Boletin del Observatorio Astronomico Nacional de Tacubaya. Vol. 2, No. 7, 1901; and Anuario 22, 1901. *The Director.*

MILWAUKEE.—Bulletin of the Wisconsin Natural History Society. New series, vol. 1, No. 4, 1901.
The Society.

MINNEAPOLIS.—Bulletin of the Minnesota Academy of Natural Sciences. Vol. 3, No. 3, 1901. *The Academy.*

MISSOULA.—Bulletin of the University of Montana. Biological series, No. 1, 1901. *The University.*

MONTEVIDEO.—Anales del Museo Nacional de Montevideo. Vol. 3, parts 20 and 21, 1901, and vol. 4, parts 19—22, 1901. *The Director.*

MOSCOW.—Bulletin of the Society of Naturalists of Moscow. Nos. 3 and 4, 1900; Nos. 1 and 2, 1901; and Nos. 1 and 2, 1902. *The Society.*

NANTES.—Bulletin de la Société des Sciences Naturelles de l'Ouest de la France. Vol. 10, parts 3 and 4, 1900, and series 2, vol. 1. parts 1 and 2, 1901. *The Society.*

NEW YORK.—Annals of the New York Academy of Sciences. Vol. 13, parts 2 and 3, 1901; vol. 14, part 1, 1901; and Memoirs, vol. 2, part 3, 1901. *The Academy.*

„ Bulletin of the American Geographical Society. Vol. 23, Nos. 2—5, 1901. *The Society.*

NOTTINGHAM.—Report and Transactions of the Nottingham Naturalists' Society for 1900 1901. *The Society.*

ODESSA.—Memoirs of the Society of Naturalists of New Russia. Vol. 23, part 1, 1899, and part 2, 1900; also Mathematical Memoirs, vol. 19, part 2, 1899. *The Society.*

OSNABRUCK.—Fourteenth Jahresbericht des Wissenschaftlichen Vereins zu Osnabruck, 1901. *The Society.*

OTTAWA.—Annual Report of the Geological Survey of Canada. New series, vol. 11, and Maps. General Index to the Survey Reports from 1863 to 1884. Also Canadian Birds, part 1, 1900. *The Director of the Survey.*

PHILADELPHIA.—Proceedings of the Philadelphia Academy of Sciences. Vol. 53, parts 1 and 2, 1901.
The Academy.

„ Proceedings of the American Philosophical Society. Vol. 11, Nos. 165 and 166, 1901 ; also Memorial Volume, vol. 1, 1900. *The Society.*

PISA.—Atti della Societá Toscana di Scienze Naturali, Processi Verbali. Vol. 12, March—July, 1901, and vol. 13, November, 1901. *The Society.*

PORTLAND, MAINE.—Proceedings of the Portland Society of Natural History. Vol. 2, part 5, 1901.
The Society.

ROCHESTER, N.Y.—Proceedings of the Rochester Academy of Science. Vol. 4, pp. 1—64, 1891.
The Academy.

ROME.—Atti della Reale Accademia dei Lincei. Vol. 9, semestre 2, fasc. 4—6, 1900 ; vol. 10, semestre 1, fasc. 7, 8, 9, 11, 12, 1901 ; semestre 2, fasc. 1—10 and 12, 1901 ; vol. 11, semestre 1, fasc. 1—6, 1902 ; also Rendiconto dell' Adunanza Solenne del, June 2, 1901. *The Academy.*

„ Bolletino della Societá Zoologica Italiana, series 2, vol. 2, fasc. 1—6. 1901. *The Society.*

„ Journal of the British and American Archæological Society of Rome, vol. 3, No. 3, 1901.
The Society.

SAN FRANCISCO.—Proceedings of the California Academy of Sciences, series 3, Geology, vol. 1, No. 8, 1900, and Zoology, vol. 2, Nos. 3 and 5, 1900.
The Academy.

ST. LOUIS.—Twelfth Annual Report of the Missoura Botanical Garden, 1901. *The Director.*

STAVANGER.—Stavanger Museum Arsberetning for 1900.
The Museum Trustees.

STETTIN.—Bericht der Gesellschaft für Volker-u, Erdkunde zu Stettin, 1901. *The Society.*

STIRLING.—Transactions of the Stirling Natural History Society, for 1900-1901. *The Society.*

STOCKHOLM.—Handlingar of the Royal Swedish Academy, new series, vol. 33, 1900; vol. 34, 1901. Bihang, vol. 26, parts 1—4, 1901. Ofversigt, vol. 37, 1900, and Lefnadsteckningar, vol. 4, part 1, 1899, and part 2, 1901. *The Academy.*

SYDNEY.—Science of Man (Journal of the Royal Anthropological Society of Australasia), new series, vol. 4, Nos. 2—12, 1901, and vol. 5, Nos. 1 and 2, 1902. *The Editor.*

TOKYO.—Mittheilungen der Deutschen Gesellschaft für Natur und Volkerunde Ostasiens. Supplement, 1901. *The Society.*

TOPEKA.—Transactions of the Kansas Academy of Science. Vol. 17, 1901 *The Academy.*

TORONTO.—Transactions of the Canadian Institute. Vol. 7, part 1, No. 13, 1901. *The Institute.*

UPSALA.—Bulletin of the Geological Institution of the University of Upsala. Vol. 5, part 1, No. 9, 1901. *The University.*

VIENNA.—Verhandlungen der Kaiserlich-Königlichen Geologischen Reichsanstalt. Nos. 4—18, 1901, and Nos. 1 and 2, 1902. *The Society.*

„ Verhandlungen der Kaiserlich Königlichen Zoologisch-Botanischen Gesellschaft in Wien. Vol. 51, 1901. *The Society.*

WASHINGTON.—Annals of the Astrophysical Observatory of the Smithsonian Institution. Vol. 1, 1900. *The Director.*

„ Year-book of the United States Department of Agriculture, 1900, and North American Fauna, Nos. 20 and 21, 1901. *The Secretary of the Department.*

WASHINGTON.—Seventeenth Annual Report of the Bureau of American Ethnology, part 1, 1898, and Eighteenth Annual Report, parts 1 and 2, 1899. *The Director of the Bureau.*

" Twentieth Annual Report of the United States Geological Survey, parts 2, 3, 4, 5, and 7, 1900, and 3, 4, 6 and 6 continued, 1901. Also Monographs, vols. 39 and 40, 1900, and volume of Maps. Bulletin of the Survey, Nos. 163—176; and Preliminary Report on the Cape Nome Gold Region, 1900. *The Director.*

" American Monthly Microscopical Journal. Vol. 22, Nos. 1—7, 1901. *The Editor.*

" Bulletin of the Philosophical Society of Washington. Vol. 13, 1900, and pp. 1—178. 1900-1901. *The Society.*

, Second Report of the United States Board on Geographic Names, 1901; and Special Report on Philippine Names, 1901. *The Secretary.*

" Annual Report of the Smithsonian Institution, for 1898-99. Smithsonian Miscellaneous Collections: vols. 42 and 43, 1901. Annual Reports of the United States Museum for 1897, 1898, and 1899. Proceedings of the United States National Museum, vol. 22, 1900; and Bulletin, No. 50, part 1, 1901. *The Smithsonian Institution.*

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From MR. R. LLOYD PATTERSON, D.L., F.L.S.—Journal of the Linnean Society (Botany). Vol. 35, No. 243, 1901.

From MR. F. B. SIMMS.—A bound volume of the Proceedings of Belfast Natural History and Philosophical Society, and seven unbound parts.

BELFAST

NATURAL HISTORY & PHILOSOPHICAL SOCIETY

SESSION, 1901-1902.

10th December, 1901.

MR. J. BROWN, President, in the Chair.

THE BELFAST MUNICIPAL TECHNICAL INSTITUTE: ITS AIMS AND ASPIRATIONS.

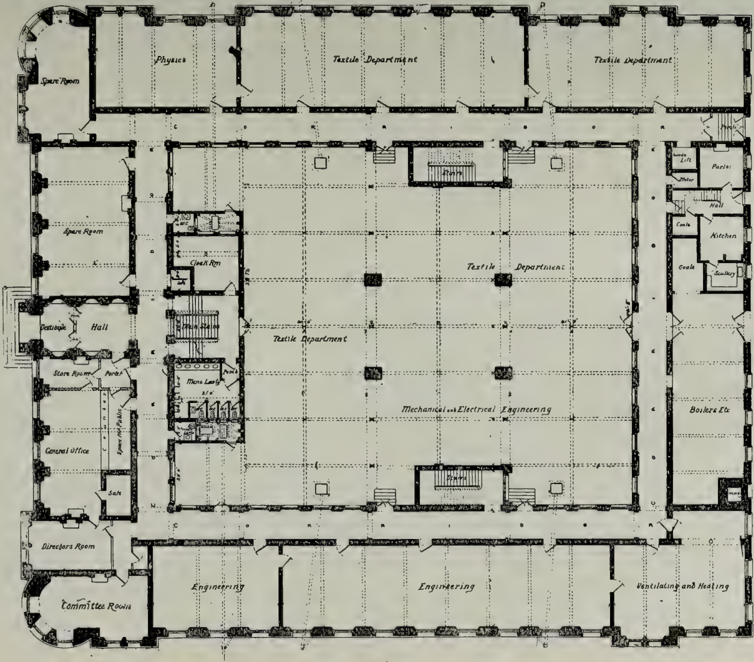
BY F. C. FORTH, ASSOC. R.C.SC.I.

(*Abstract.*)

IN the course of his remarks, Mr. Forth stated that as early as the year 1807 a meeting was held in Belfast for the furtherance of instruction in Science and Technology. At a more recent period, viz., in the year 1883, the Royal Commission on Technical Education had held an enquiry in Belfast as to the facilities provided for technical instruction. Extracts read from the report of the Commissioners went to show that the educational facilities provided in the city were at that period in a very unsatisfactory state.

Fig. 1.

NEW MUNICIPAL TECHNICAL INSTITUTE, BELFAST.



GROUND PLAN

The Site measures 240 feet by 204 feet 6 inches.

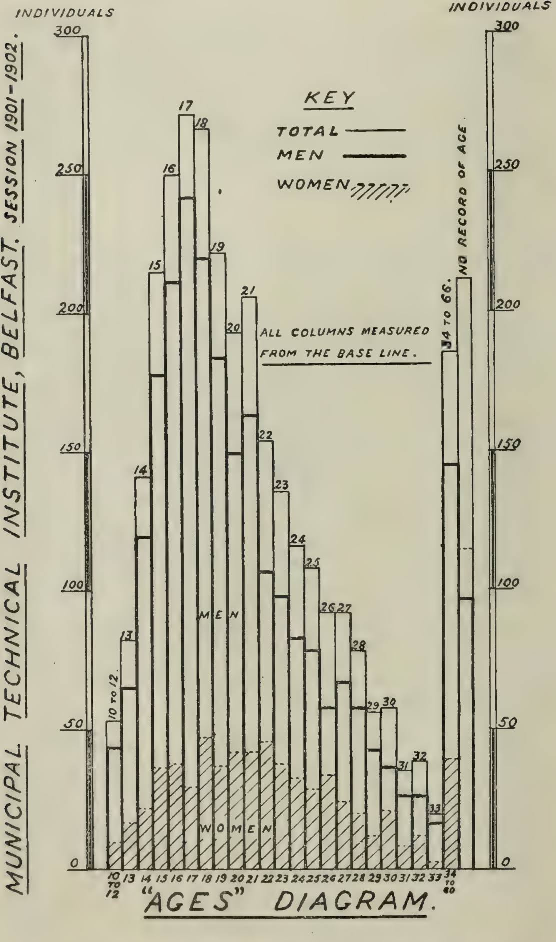
Fig. 2.

The lecturer then reviewed the steps which had led up to the recent revival of interest in technical instruction, beginning by referring to the labours of the Recess Committee. He then detailed the steps that had been taken for the development of the Municipal Technical Institute scheme, and stated that the classes recently established had been largely availed of, and that the numbers in attendance were well above the estimated numbers.

Reference was then made to the imperfect accommodation which is at present available for the majority of the classes, and the proposals with regard to the new Technical Institute were explained, the remarks being illustrated by reference to views of the proposed new building, the views being projected on the screen by means of the optical lantern. The perspective view of the building is shown in fig. 1, and the ground plan in fig. 2. The dual character of the Institution was dwelt upon, the explanation being given that there would be a Day Department and an Evening Department. The functions of these Departments were outlined, and explanations supplied as to the training which would be imparted to the students in the respective departments. Special emphasis was laid on the fact that it was necessary to adapt the courses of study to the industrial requirements of the City, care being taken that as far as possible the instruction should be well balanced. It was explained that students trained in this way would be fitted to take up situations as foremen and managers, and to fill other like positions of responsibility.

It was stated that the building is intended to be erected on a site bordered by College Square North and College Square East. Various details in regard to the areas of the building, the style of architecture, the position of the entrance hall, vestibule, corridors, classrooms, and the departmental accommodation were then supplied.

Mr. Forth next proceeded to discuss the question of the supply of suitably prepared students for the Institution, stating



VERTICAL SCALE = 40 INDIVIDUALS PER INCH.

Fig. 3.

that these would have to come from the National Schools and Secondary Schools. He drew attention to the inadequacy of the training given in the Primary Schools, and offered the opinion that some facilities should be provided for higher primary instruction, suggesting that four or five schools might be established in special districts of the City to deal with children who had passed beyond the sixth standard of the ordinary National School. He explained that scholarships would be available, giving admission to the Day Department of the Technical Institute, and stated that Free Studentships admitting to the Evening Department were already in operation.

Referring to the existing Evening Department he mentioned that over three thousand * tickets for evening courses of instruction had been issued, and that over two thousand † tickets had been issued for single lectures.

It was shown by means of a diagram (figure 3) that the students were not of immature age, as was sometimes imagined, but that the proportion of those eighteen years of age and over, to those under eighteen years was as five is to two.

He spoke of the fear that had been expressed that the Technical Institute might prejudically affect some of the existing institutions, and said that, in his opinion, this fear was unfounded. He also deprecated the unnecessary duplication of courses of study. He pointed out the economy resulting from the co-ordination of institutions running on similar lines instancing the various institutions which had been recently merged in the Technical Instruction Scheme. The lecturer stated that his main fear was not that overlapping would take place, but that the chief difficulty would be found in filling up the hiatuses in the present education system. By means of a

* Now (April 1902) over 4,000.

† Now (April 1902) over 4.500.

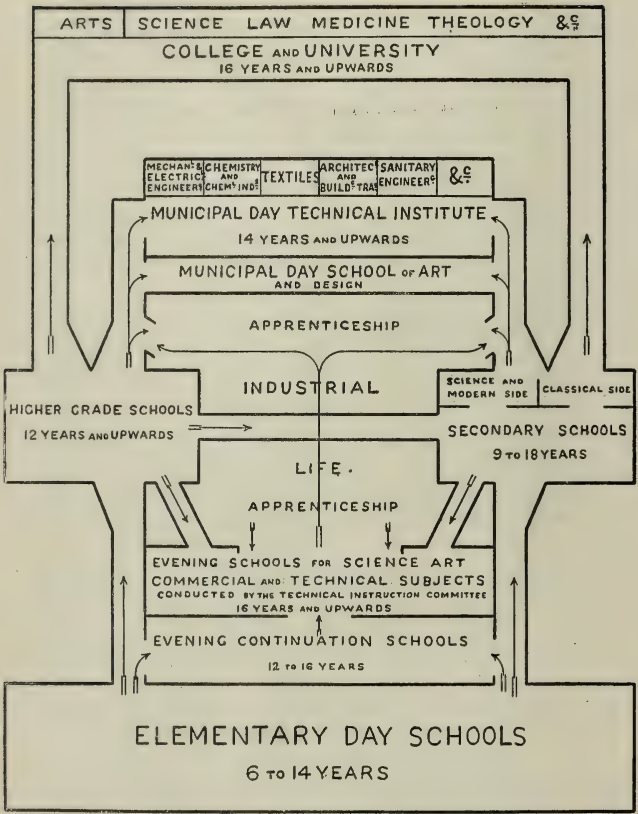


DIAGRAM ILLUSTRATING THE CORRELATION OF EDUCATION

Fig. 4.

diagram (fig. 4) projected on the screen, he then illustrated an educational programme showing a direct connection between the Primary Schools and the Municipal Technical Institute and the University.

Mr. R. H. S. Reade proposed a hearty vote of thanks to Mr. Forth for his very able lecture. Although Belfast had been slow to assimilate the idea of the necessity of technical instruction, he thought from what they had heard that they might be satisfied that it had embarked on the course in a right spirit, and that the work would be done properly under the guidance of Mr. Forth. He had proved that evening that he had grasped the whole subject of education, and showed them that technical education was only a part of the great system of education in the country, which ought to be co-ordinated, and that technical instruction should form an outgrowth from it. He had brought under their survey the whole system of education, which he (Mr. Reade) believed was bound to be taken up and re-organised if they were to hold their place with the other nations of the world.

Professor FitzGerald, in seconding the motion, thought the Technical Instruction Committee was to be congratulated upon the vanishing of a large amount of obstruction which at one time existed in the city—and he thought in the Corporation—to counting many of those subjects as technical at all. It was supposed then that technical instruction must necessarily be confined absolutely to trade instruction, without teaching anything in the matter of scientific subjects. With regard to Mr. Forth's remarks in regard to primary schools, he did not know what powers the Corporation possessed as to constituting themselves managers under the National Board of any model schools which might be established in the city. But now that the Corporation had made a start in the matter of technical education, after a delay of seventeen years, they would have to do more. He had long ago advocated the establishment of a system of evening continuation schools by the Corporation, and

was glad to find that it seemed likely that what would be, in effect, such a system, was now under consideration.

Sir James Henderson endorsed all that had been said by Mr. Forth, who, he thought, had hit the weak spot in our educational system. Something was required between the national school and the higher educational establishments in the future. With regard to the Technical School in Belfast, the large sum of £85,000 would be necessary to put the building into the from which had been so admirably described by Mr. Forth, therefore the Committee were compelled to ask the ratepayers for 1d in the £1, which would bring them £5,000. At the present time this sum, together with the £10,000 which they were receiving from the Department of Technical Instruction in Dublin, was the annual amount available for technical education in Belfast. The Belfast Natural History and Philosophical Society was deserving of the highest praise for allowing them the privilege of hearing that lecture, which would be of great assistance in spreading technical instruction in Belfast.

Sir Otto Jaffe considered that at an early period they would see a fair amount of progress in Belfast as a result of their efforts. The Corporation in selecting Mr. Forth as the principal of the new school had got one of the best officers they could have obtained for this department.

Dr. M'Keown said in the matter of primary education he saw little hope of any great improvement so long as they had such a Board of National Education as existed at the present in Dublin. It was his firm conviction that until the people took the control of education into their own hands it would never be right. They wanted in a city like Belfast a board representing the people for the purpose of regulating this primary education. Now, many of the schools from a sanitary point were unfit for occupation by children. He believed that the time would come when the Corporation would have to build schools of their own, and not allow them to be appendages to any Church whatever. A teacher in a primary school was an important

individual, and until his position was elevated and he was removed from being the slave of the manager, matters never would be right. Although teachers are paid by the State, many of them were slaves to the managers, which should not be the case. They wanted a proper guiding hand to undertake the co-ordination of primary, secondary, and university education. Coming to the matter of technical education, it was well to point out that at the present time there was a Commission of Inquiry sitting in this country inquiring into technical education, and it was a very extraordinary body. The Irish members of that Commission, who sat recently in Dublin, and took evidence on technical education, were excellent men in their own way, but there was not one of them who was fit to deal with technical education, and only one known to have had a scientific education. That solitary individual was a pathologist, not likely to have much knowledge of trade and industry. He would not like to say much about their finding on technical education, but he did know a remarkable fact, that two gentlemen who could have given valuable evidence, and who tendered it, had not yet been examined. It was to be hoped their evidence would be taken at a later sitting.

Mr. William Gray, was of the opinion that the prospects were exceedingly encouraging, judging by the number of pupils who were coming forward, and they trusted that the anticipations of Mr. Forth would be fully realised. The time had come when they ought to take some positive steps in Belfast to improve the primary education of the rising generation.

Dr. MacCormac held that teaching results would accrue mentally to those attending the continuation schools.

The Chairman then put the motion, which was passed by acclamation.

6th January, 1902.

Professor Redfern, M.D., F.R.C.S.I., in the Chair.

RESPIRATION.

By Joseph Barcroft, M.A.

(*Abstract.*)

Mr. Barcroft said that on a previous occasion he had the pleasure of addressing the Belfast Natural History and Philosophical Society upon a subject which, among physical phenomena, has always been of peculiar interest to himself—namely, " The Properties of Liquid Surfaces." The interest of such a subject as that seemed, however, to fade before the fascination possessed by even the simplest process of living matter. There is a subtlety about the secret of life, an uncertainty as to whether the chemical changes which take place in living matter are governed by the laws which are enunciated in the laboratory that make the study of the functions of living matter especially alluring.

On occasions the physical and chemical properties of living matter seem to be exactly the opposite of those displayed by that which is inanimate. He would take two examples. There could be no greater travesty of their ordinary ideas than that water should flow upwards, yet when they got into the domain of life they saw trees one hundred, two hundred feet high, and in the fine tubes composing the wood of those trees they knew that the sap is continually ascending.

Drawing attention to the burning of a match, the lecturer proceeded to say that the wood was decomposing with evolution

of heat, and the solid material was being oxidised and dissipated into the air as aqueous vapour and carbonic acid gas ; but could they, he asked, reverse the process, and, by supplying the necessary heat, make wood out of carbonic gas and water ? That would be like expecting water to flow up a hill, for the laboratory rule is that chemical changes are such as to produce heat and do not take place in the opposite direction. Yet this is exactly how the wood has been made ; the tree has silently absorbed these very substances and built them up into wood.

Of the ordinary functions which living bodies perform, the one which is most nearly understood is respiration, and therefore he had chosen it for the subject of that night's lecture. Respiration in its most superficial sense means the breathing in of pure air, and the exhalation of impure air. But they might give a larger meaning to the word. He had alluded to a burning match, and said that the wood of this match was being oxidised by oxygen drawn from the air, that it emitted heat, and that the substance got dissipated. The same process, he pointed out, is taking place continually in every part of the human body. When he moved his finger some oxygen was used up and some carbonic acid gas and water were parted with ; the oxygen was breathed in by the lungs, the carbonic acid and water would in due time be breathed out by them. The problem was to investigate the processes by which the oxygen of the inspired air is carried to the hidden recesses of the body, and those by which the carbonic acid is carried from the tissues to be cast out into the air of the lung.

They would observe on the screen a slide representing human blood ; it was made up of numerous corpuscles which float in a clear fluid. Each of these corpuscles is a sort of submarine boat plying between the lungs and the tissues, and at every journey it takes in a cargo of oxygen at the lungs, which it unloads on reaching the small blood vessels of a muscle or other tissue. The corpuscle is composed largely of a red material—hæmoglobin—to which the colour of the blood is due. This red material has the power of absorbing oxygen

when exposed to the atmosphere. There are other substances such as pyrogallic acid which do the same, but the red substance of the blood differs from pyrogallic acid in the fact that when it is exposed to an atmosphere devoid of oxygen it disgorges all the oxygen which it has previously absorbed.

The lung is an apparatus for exposing an immense surface of blood to the air. While thus exposed each corpuscle takes up its cargo of oxygen, and then gets propelled with extreme rapidity in the blood stream to some indigent muscle or nerve which has used up all the oxygen that it possesses. Here, not being surrounded by oxygen, the corpuscle gives up its store of that gas just as a wet sponge-rag would yield up its store of water when removed from a damp to a dry atmosphere.

It was formerly a matter of great labour, involving the use of large quantities of blood, to demonstrate the relative amounts of oxygen in blood going to and coming from the lungs, but recent researches had made it so simple that he could easily show them how much oxygen the blood loses at its ports of call.

He had compared the colourless fluid portion of the blood to a waterway, and he could press the comparison a stage further. The clear fluid part is more than a medium for carrying the corpuscles—it serves to flush out every piece of muscle and nerve and bone. Each of these accumlates its little store of carbonic acid as it does its work, but this gas si exceedingly soluble in water, and so as fast as it is produced it gets caught up in the colourless part of the blood and carried to the lungs. A pint of water would absorb about a pint of carbonic acid gas. If the solution be shaken up with air the water would lose carbonic acid till both the air and the water contained the same percentage of the carbonic acid. He had almost said that that was an illustration of how the blood lost its carbonic acid in the lung ; that an immense surface of blood was continually circulating through the lung separated only by the thinnest of membranes from the air in that organ ; that it tended always to share its carbonic acid equally with the air,

but that, as the air was always changing, it never had time to obtain as much carbonic acid as the blood would give up, and so a continual stream of carbonic acid passed from the blood to the air in the lung.

But he must pause, for whilst many distinguished physiologists would endorse such a statement, there were others who considered that they were confronted at that point with a paradox of life such as he had already mentioned; that in the ordinary way after the blood has given up its quotum of carbonic acid the living wall of the lung exerts an influence on the blood which no dead membrane could exert, and makes the blood concede yet further stores of carbonic acid to the air, thus enormously increasing the efficiency of the respiratory apparatus. The point is one of great interest to physiologists, and it is one on which much careful work has been done. While the matter remains unsettled it would ill befit him to express an opinion upon it, in view of the fact that some of the most recent and telling researches on the subject have been those of Dr. John Haldane and Professor Lorrain Smith in the laboratory of Queen's College, Belfast.

Professor Lorrain Smith said their Secretary had asked him to move a vote of thanks to Mr. Barcroft for his interesting lecture, but he would preface his remarks by a promise to and no more details to the many facts Mr. Barcroft had put before them. He himself had followed the lecture with the greatest interest, and he was sure this had also been done by everyone present. As one whose duty it was to lecture and experiment at the same time, Mr. Barcroft had managed to get through a subject which was perplexity itself with wonderful rapidity. The success with which he had carried out the experiments at the end of the bench, where he had been engaged analysing the blood from oxygen, was remarkable. It was not so very long ago since it took a large part of a day to carry out an experiment of that sort, but Mr. Barcroft had shown them that night that this observation can now be carried out with the

simplest possible apparatus with perfect accuracy and great rapidity. The method was new, and the easy way in which it could be carried out gave rise to great hopes in the medical profession that they would be able to apply this method to the human body both in health and disease. He had great pleasure in moving that vote of thanks to Mr. Barcroft for his lecture.

Professor Thompson, in seconding the motion, said Mr. Barcroft had handled an exceedingly difficult subject with great skill. He came to Belfast with the reputation of being a neat and skilful experimenter, and he had very successfully maintained that reputation. He had indeed a very difficult subject to make clear to them, but he had managed to make clear to everybody in the room what the essential features of respiration are. He (Professor Thompson) had great pleasure in seconding the motion.

The Chairman, in putting the motion to the meeting said they had come there that night to learn something of respiration, and they had not been told what sort of process it was, but they had been made to see it. Every step of the process had been shown them most successfully, and not one tittle of the experimental truth had in any degree failed. As they came there that night to learn something of respiration, he would advise them when they went to their respective homes to take a sheet of paper and jot down the particulars of the facts shown them, and in that way they would remember, have before them, an account of respiration such as, he ventured to say, they had never had before, and were not likely to get again for a long time. The various demonstrations had been most admirable, complete, and perfect. It was rarely indeed they found when a series of experiments had to be performed that some little thing did not go wrong, but nothing of the sort had happened that night from start to finish. He trusted that in the study of physiology, which is becoming an experimental science for the purpose of the investigation of the process of life, Mr. Barcroft would not only

have a happy year, but that he would continue a great number of years to teach as he had taught them that evening.

The resolution was heartily passed.

Mr. Barcroft, in acknowledging the compliment, said he wished to thank the mover and seconder of the motion for their kind words, and the members of the audience for the patient way in which they had listened to that subject, which, as Professor Lorrain Smith had stated, was complicated. He also thanked Professor Thompson for having put his laboratory at his disposal for the purpose of having the experiments prepared.

4th February, 1902.

MR. J. BROWN, President, in the Chair.

NOTES ON LOCAL SURVIVALS OF ANCIENT HARVEST CUSTOMS.

BY JOHN M'KEAN.

THE HARE, CHURN OR COLLYA.

THIS Harvest custom is widely spread over the North-East corner of Ireland. When the corn is being cut the last handful is plaited up as shown in this specimen. Then the harvesters all gather round and proceed as follows :—

They either stand about 9 feet off and throw their sickles in turn at it until it is cut down, or each is blindfolded in turn, advances towards it, and has one cut at it with a scythe till it is mown down. Or again, each pulls up a root in turn till all the roots are pulled up.

Two other modes, obviously degenerate forms are to cut it with the scythe or the machine without any ceremony.

In those cases where the ceremony still survives, the harvester who cuts the ears or the harvester who pulls the last root is honoured in different ways. Generally he gets the first drink at the harvest-home, which is everywhere called the "churn." Near Glenarm, he or she hangs the "hare," as it is there called, over the doorway and has a right to kiss the first person of the opposite sex who enters. In one part of Armagh

the reaper's hand is crossed with silver. Near Keady, in days gone by, the successful person led the "churn" or harvest dance.

The "churn" is kept for the whole year or even longer where the custom still lingers strongly. This specimen is one of three got at one farm, but more usually the custom has decayed and the churn is kept only for a short time. In one place the "churn" is said to guard one's store, but as a rule the country folk give no reason for the custom except sometimes a vague idea that it is lucky.

The three names which I have given are not all used together. The name "churn" is by far the commonest, the name "hare" I have found only in the glens, the name "collya" only in Armagh. It is worth noticing that the name "churn" is applied to the harvest-home even in places where the queue of oats has a different name.

I have found the custom both in the extreme north and south of Antrim, in Down about Newtownards and perhaps near Newcastle, and in north Armagh. In fact I have found it everywhere where I have been able to search for it. I have also heard vague accounts of such a custom in Tyrone but the accounts are not accurate enough to mention.

The "churn" should be compared with customs like the English "Kernababy," and the Scotch kern-maiden, and a host of other examples given in Mr. J. G. Frazer's "Golden Bough." The same authority, vol. ii, p. 269 (second edition), mentions exactly the same custom in Ayrshire and Galloway where the plait is called the Hare.

THE NORTHERN BLACKWATER: ITS SCENERY, ANTIQUITIES AND BATTLEFIELDS.

By John J. Marshall.

(*Abstract.*)

Mr. Marshall introduced his subject by stating that in the history of all countries rivers had ever played an important part, whether as waterways to bear the argosies of commerce upon their breast or as the fitting theatre of events exercising a decisive influence on the nation's future. The rivers of Europe recalled to memory many historic scenes enacted on their banks, and to Ulstermen the Blackwater was ever associated with the memories of the brave O'Neills, and in later years with Charlemont and Grattan. Though the stately ruins of no cloistered abbey were reflected in Blackwater's wave, yet sacred legends and hallowed associations were connected with the stream from the dawn of Christianity in Erin, while earlier still the cairn on the summit of Knockmany, overlooking the fort of Rathmore, carried them back to Ireland's heroic age. Rathmore, in Magh-Lemna, as it was usually called, to distinguish it from the Rathmore in County Antrim, was the great fort situated in the Palace grounds at Clogher, and, according to the annalist, was dug by "Baine, daughter of Scal," the date being early in the second century. The lady was buried on the summit of the adjoining hill of Knockmany; hence its name. There was also in this district the remains of Aughentaine, another interesting Plantation castle, noteworthy as the birthplace of William Montgomery, author of the Montgomery MSS. The next important place on the river was the town of Aughnacloy, founded by the Moore family. Here Wolfe Tone passed a night on his way as a prisoner from Derry to Dublin in 1798. Tynan, so long associated with the name of Dr. Reeves and also famous for its

stone crosses, next claimed attention, as well as Tynan Abbey, the picturesque residence of Sir James H. Stronge; while on the opposite bank of the river stood Caledon, with its memories of Sir Phelim O'Neill and the days of 1641, with many a stirring tradition of fight and foray in still earlier times, when it was a residence of the O'Neills. Continuing down the river, the Battleford Bridge was reached. It was here that in 1646 the Scots' army, under Munro, was defeated by Owen Roe O'Neill, and driven with great slaughter across the Blackwater. One of the most important places in Ulster during the latter part of Queen Elizabeth's reign was Portmore, or the Fort of Blackwater, erected as a curb on the power and independence of O'Neill. It was taken and retaken several times, and it was in order to effect its relief that the celebrated battle of the Yellow Ford was fought in 1598, in which the English army suffered a crushing defeat at the hands of O'Neill and Red Hugh O'Donnell. It was finally allowed to fall into decay when Charlemont was erected by Lord Deputy Mountjoy, the modern castellator of Ulster, in what he considered to be a more suitable place. From Charlemont onward the river flowed through fertile pasture lands unmarked by any object of interest until it discharged its waters into Lough Neagh, some seven miles farther down, at the village of Maghery. At this point the river divided into two branches, forming a delta known as Derrywarrgh Island. On this island, if so it might be termed, there stood a chimney and part of a gable, being the only remaining portions of the Fort of Blackwater at the river foot, which was planted there during the rebellion of 1641 as a check on the garrison of Charlemont.

The lecture was illustrated with upwards of seventy limelight views, specially taken by Mr. Marshall, and shown by Mr. M'Gibney, of Messsrs. Lizars.

A hearty vote of thanks to the lecturer brought the meeting to a close.

5th March, 1902.

Sir R. J. M'Connell, Bart., in the Chair.

THE IRISH INDUSTRIAL AWAKENING.

By Seaton F. Milligan, M.R.I.A.

A popular lecture, illustrated by Lantern views ; the proceeds were devoted to the reduction of debt of the Causeway Defence Committee.

8th April.

Mr. J. Brown, President, in the Chair.

REPORT OF DELEGATE TO CORRESPONDING SOCIETIES' CONFERENCE, BRITISH ASSOCIATION MEETING, 1901.

By J. Brown.

As your delegate I attended both meetings of the Corresponding Societies' Conference, and now beg to offer a very brief report referring merely to the chief points brought forward, and leaving the further elucidation of even these to be looked for in the full report issued by the Association. At the first meeting, Mr. F. W. Rudler, F.G.S., presided, and in his

address dealt chiefly with the importance of the Registration of Type Specimens in Local Museums in order that reference to such specimens might be readily attainable by those interested in the particular domain of science to which they belonged.

After a long discussion, the Chairman called on the

Rev. J. O. Bevan to open the subject accepted of him by the Corresponding Societies' Committee for discussion at this Conference :—" Thàt the Committees of the Corresponding Societies be invited to lay before their members the necessity of carrying on a systematic survey of their counties in respect to ethnology, ethnography, botany, meteorology, ornithology, archæology, folklore, etc."

The discussion resulted in the appointment of a small Committee, whose report, as follows, was adopted at the second Conference.

" The following provisional list of subjects, together with the names of some of the Societies which have already done work in connection therewith, and the names of persons who would be willing to receive communications thereon is recommended by the Conference of Delegates for adoption by the Corresponding Societies' Committee of the British Association, and to be issued by them to the Corresponding Societies in the hope that those Societies not already engaged in similar work may take part in so much of it as comes within their scope, in order that the work may be extended over a wide area, and be done as far as possible upon a uniform system.

"Registration of Type Specimens," Dr. A. Smith Woodward.

" Coast Erosion," Mr. W. Whitaker.

" Record of Bore Holes, Wells, and Sections," North of England Institute of Mining and Mechanical Engineers, and Prof. J. H. Merivale.

"Tracing the Course of Underground Water," Yorkshire Geological and Polytechnic Society, and Mr. A. R. Dwerryhouse.

"Erratic Blocks," Yorkshire Naturalists' Union, and Professor P. F. Kendall.

"Geological Photographs," Belfast Naturalists' Field Club, and Professor W. W. Watts.

"Underground Fauna," Rev. T. R. R. Stebbing.

"Variations in the Course of Rivers and Shape of Lakes," Dr. H. R. Mill.

"Archæological Survey by Counties" Woolhope Field Club, and Rev. J. O. Bevan.

"Ethnographical Survey," Anthropological Institute.

"Botanical Survey by Counties," Mr. W. G. Smith.

"Photographic Record of Plants," Mr. A. K. Coomra-Swamy.

Professor H. M'Leod, on behalf of Section B, said they had nominated a Committee to register the Scientific Chemists who are at work in Manufactories, and would be glad of assistance in finding out the names of such persons.

Section C (geology) again asks for Geological Photographs and information regarding erratic blocks.

Section H (Anthropology) wants records of the survival of primitive customs, industries, appliances, etc.

Section K (Botany) would be glad to receive specimens of blue-green algæ of various conditions for examination, also photographs of bctanical interest.

THE MOURNE SCHEME FOR THE SUPPLY OF WATER TO THE CITY OF BELFAST.

By John L. Macassey, C.E.

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Natural History & Philosophical Society.

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Report and Proceedings

OF THE

BELFAST NATURAL HISTORY & PHILOSOPHICAL SOCIETY

FOR THE

SESSION 1902-1903.

BELFAST:
PRINTED BY ALEXR. MAYNE & BOYD, 2 CORPORATION STREET
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Belfast Natural History and Philosophical Society.

ESTABLISHED 1821.

CONSTITUTION.

The membership of the Society consists of Shareholders in the Museum, Annual Subscribers (Associates), Honorary Members and Honorary Associates.

Shares in the Museum cost £7 each. A holder of one Share pays an annual contribution of ten shillings; a holder of two Shares (in one certificate) an annual contribution of five shillings; while a holder of three or more Shares (in one certificate) is exempt from annual payments. Shares on which the annual payments as above are in arrear are liable to forfeiture. The Council retain the right to decline to consolidate two or more share certificates into one certificate.

Annual Subscribers (Associates) pay £1 1s. (one guinea) due 1st November in each year in advance.

A General Meeting of Shareholders in the Museum is held annually in May or June, or as soon thereafter as convenient, to receive the Report of the Council and the Statements of Accounts for the preceding year, to elect members of Council to replace those retiring by rotation or from other reasons, and to transact any other business incidental to an annual meeting. Shareholders only are eligible for election on the Council.

The Council elect, from among their own number, a President and other officers of the Society.

Each Member has the right of personal attendance at the ordinary lectures of the Society, and has the privilege of introducing two friends for admission to such; and he has also the right of access to the Museum and Library for himself and family residing under his roof, with the privilege of granting admission orders for inspecting the collections in the Museum to any person not residing in Belfast or within five miles thereof. The session for lectures extends from November till May.

The Museum, College Square North, is open daily for the admission of visitors, for such hours as the Council may from time to time decide; the charge for admission to non-members is sixpence each. The Curator is in constant attendance, and will take charge of any donation kindly presented to the Museum or Library.

Any further information required may be obtained from the Honorary Secretary.

Belfast Natural History and Philosophical Society.

ANNUAL REPORT, 1902-3.

The Annual Meeting of the Shareholders of this Society was held on 3rd July, 1903, in the Belfast Museum, College Square North. The chair was occupied by Mr. John Brown, F.R.S. (President), and there were also present—Sir Robert Lloyd Patterson, D.L., F.L.S.; Professor Johnson Symington, M.D., F.R.S.; Rev. Lamont Orr, Dr. John MacCormac; Messrs. George Kidd, J.P.; Robert Young, J.P.; R. M. Young, J.P., M.R.I.A., Hon. Secretary; Joseph R. Fisher, B.L.; W. Gray M.R.I.A.; R. Patterson, M.R.I.A., F.Z.S.; John Smyth, M.A Nevin H. Foster, John Horner, Isaac W. Ward, W H. F. Patterson, Hon. Treasurer.

The Hon. Secretary having read the notice convening the Meeting, submitted the Annual Report as follows:—

"The Council of the Belfast Natural History and Philosophica Society desire to submit their Report of the working of the Society during the past year. The Winter Session was opened in the Museum, on the 5th November, 1902, when the President, Mr. John Brown, F.R.S., gave an opening address taking as his subject 'The Liquefaction of Gases,' illustrated by numerous experiments. The Second Meeting was held on 2nd December, when Professor Gregg Wilson, D.Sc., kindly delivered an address on 'Recent Fishery Research,' illustrated by special lantern slides. The Third Meeting (a special one) was held on 17th December. On this occasion Mr. Richard J

Ussher, M.R.I.A., Waterford, gave a lecture, subject 'Evidence of the Caves,' illustrated by lantern views. On the 6th January, 1903, the Fourth Meeting was held, when Dr. John MacCormac lectured on the subject of 'Heredity in its Relation to the Nervous System,' illustrated by specially prepared lantern slides. The Fifth Meeting took place on the 3rd February, when two papers were read. I. 'The Micro-fauna of the Boulder Clay, with some Remarks on the Movement of Glaciers, illustrated with tables, diagrams, and lantern slides, by Mr. Joseph Wright, F.G.S. II. 'Notes on Some Igneous Rocks in Down and Antrim,' illustrated by specimens, slides, and microscopic sections, by Miss Mary K. Andrews. The Sixth Meeting was held on the 3rd March, when Rev. W. Spotswood Green, M.A., kindly gave an illustrated lecture, subject 'The Armada Wrecks on the Irish Coast.' The Seventh Meeting took place on the 7th April, when Mr. George Coffey, M.A., M.R.I.A., kindly lectured on 'A Lost Principle in Art,' illustrated by a special series of lantern views of ancient and mediæval buildings. At all these meetings the attendance of members and of the general public showed no diminution, and several of the lectures were the subject of reference and discussion in the Press.

Owing to the erection of the new Medical Institute, our Society has lost the Ulster Medical Society as tenants. This is to be especially regretted, as the relations between the two Societies have been uniformly harmonious. The room which was occupied by them has been taken by the Belfast Naturalist Field Club for the purpose of a library and meeting place for members. The other societies holding their meetings in the Museum continue to do so.

The attendance of the general public has been, as usual, very large at the Easter holidays, when the Museum was opened at a nominal charge, and no damage was done to the collections.

As will be seen by the Hon. Treasurer's Statement of Accounts, duly audited by the Local Government Board's

Auditor, a satisfactory balance remains after paying all expenses. This, however, it must be borne in mind, results from the thoughtful generosity of the local committee of the British Association, who decided to pay to the Society the balance of the general fund raised for last year's meeting.

Mainly as a result of the suggestions made by Professor Gregg Wilson in his lecture on 'Recent Fishery Research' on 2nd December, a meeting of representatives of our own Society, the Belfast Naturalists' Field Club, and the Queen's College was convened by your Secretary on the 16th December to consider the advisability of the establishment of a marine biological laboratory. As a result the Ulster Fisheries and Biology Association has been established, with Mr. Robert Patterson, M.R.I.A., F.Z.S., as its Honorary Secretary and Treasurer. Already good work has been done, and much interest aroused for its future welfare.

The natural history collections in the Museum have received a great amount of attention during the year, and the much-needed work of revision and rearrangement has to a large extent been carried out by a number of volunteer experts. The Irish fossils, which form a large and valuable series, have been taken off the old tablets and remounted on a new system by Mr. W. Swanston, and now make a most effective display. The important set of County Down graptolites is not yet in place, but is being renamed and classified by Professor Lapworth and will then form a standard collection of the Irish species of these ancient fossils.

The collections representing Irish vertebrate zoology have been taken in hand effectively by Mr. Robert Patterson. Old and imperfect specimens have been replaced, and those retained carefully cleaned, adding much to the brightness and attractiveness of the rooms. Seven drawers of birds' eggs have been classified and mounted on the modern system by Messrs. Nevin H. Foster and John Cottney. Many clutches of eggs, hitherto absent or imperfectly represented, have been added, and there is now a complete series of the eggs of Irish nesting birds.

The Rev. W. F. Johnston and Mr. H. Lamont Orr have done much work in supplying, arranging, classifying, and mounting the collections of native insects. Some of the groups are fairly well represented, especially coleoptera, but large gaps still remain. It is to be hoped that some of these will ere long be closed up.

Mr. Joseph Wright, F.G.S., took up the arrangement of the Foraminifera. A large number of specimens were added by him to the existing collection. All were re-mounted on the most effective system known, and by Mr. Wright's kindness the Museum now possesses a series of Irish Foraminifera, both recent and fossil, more complete than that of any other institution in the country.

There have been many valuable recent additions to the Museum collections. The specimen of golden eagle from County Donegal, presented by Sir James Musgrave, is noteworthy by reason of the ever-increasing scarcity of this bird in Ireland. Two cases of salmon, pictorially mounted, presented by Mr. Robert Patterson, are also specially attractive additions. The collections generally have been removed from the cabinets, cleaned, and replaced, and the relabelling of the objects is now being carried out by the assistant curator. Dr. A. Harris, of Stewartstown, has kindly placed in the Museum on loan his very valuable collection of Naga weapons and personal ornaments of the hill tribes of India. These while they remain will form an interesting and attractive exhibit. A list of donations to the Museum and of the publications received during the Session from the various societies with whom we are in correspondence will be printed with the present report. Five members of the Council retire from office as usual, of whom four are eligible for re-election.

The Hon. Treasurer read the Statement of Accounts, which showed that the year had commenced with a balance of £16 16s. 7d., the total receipts being £361 17s. 5d. The two principal items were bequests and donations, £136 1s., and subscriptions, £112 10s. The expenditure for the year

amounted to £303 4s. 5d., the balance in Treasurer's hands being £58 13s., while £400 worth of the York Street Spinning Company's Debenture Stock is still held by the Shareholders.

Professor Symington said that he had much pleasure in moving the adoption of the Report and Statement of Accounts. He need not say much, because it appeared to him that Report generally was of a very satisfactory nature. During last winter they certainly had a very excellent series of lectures, and he was glad to hear that the valuable collection in the possession of the Society was being taken good care of, and in many respects rearranged and brought up to modern requirements.

Sir Robert Lloyd Patterson expressed his pleasure in seconding the resolution. He need not take up much of their time, for in every way they considered the Report satisfactory. He wished, however, to point out that but for the fortunate circumstances of receiving a cousiderable sum from the local committee of the British Association their finances would not have been in the satisfactory condition they were. They could not expect that item to arise again, and he would urge, as he had done often before in that room, the importance of that Society and the claims it has on public support, which claims, he was sorry to say, were not recognized as the members felt they ought to be.

The President said he ought to take this opportunity of expressing the great regret which he was sure they all felt at hearing of the death of one of their oldest members, Mr. Isaac J. Murphy. At one time he was a very frequent attender at their meetings, and gave many interesting lectures, while he also presented to the Society considerable apparatus. They all regretted very much that he had passed away.

In speaking of the Report, one of the things he was happy to notice was the great preponderance of natural history papers. Although he was not a naturalist himself, that was a naturalists' society, and it was many years since they had so many, and so good, papers on the subject. In former years it was left to the engineers and other such people to save the Society from utter

extinction, so far as the reading of papers was concerned, by bringing forward subjects in which they were interested.

A very important event in the past Session was the nauguration of the Ulster Fishery and Biological Association, which had largely emanated from Professor Gregg Wilson's lecture on 'Fishery Research.'

It was satisfactory to see that donations still flowed in, and almost seemed to increase through the kindness of the people named in the Report. He was pleased to note also that others had been kind enough to help them to rearrange the collection, which was now in a much better state than it had been for a long time; the balance in hands was satisfactory, and altogether he thought they might be congratulated upon having had a prosperous year.

The Report and Statement of Accounts were then passed.

Mr. Robert Young suggested that it would be desirable to send a letter of condolence to the family of the late Mr. Isaac Murphy.

Sir R. Lloyd Patterson seconded, and the suggestion was unanimously approved of.

The following gentlemen were elected to the Council of Management for the ensuing year:—Rev. Dr. Hamilton (President, Queen's College), Professor Symington, F.R.S., Professor Gregg Wilson, Mr. R. M. Young, J.P.; and Mr. T. F. Shillington, J.P.

Mr. Joseph R. Fisher said he had pleasure in rising to move a vote of thanks to the President for his conduct in the chair during his term of office. As a new member, he was not in a position to speak with any amount of experience of Mr. Brown's services in that particular capacity, but generally his great scientific attainments and knowledge of business had fitted him to carry on the invaluable work of that Society. He (the speaker) would simply move that the best thanks of the Society be given to Mr. Brown for his presidency during the last three years.

Mr. William Gray, in seconding, said he thought it ought to

be a great satisfaction to the citizens of Belfast to have amongst them a gentleman of Mr. Brown's attainments, and whose family was connected with the material progress of the city; one who had distinguished himself by his original research. As members of that Society, he thought they ought to be very grateful indeed to him for applying his high attainments in promoting the best interests of the Society.

The vote of thanks was heartily accorded.

Mr. Brown, in response, said that he was very much obliged to the members for their kindness. Any work he had done for the Society had been a labour of love, and he had only been anxious that it should be on the right track, and productive of good results. Although he was retiring from the office of President, his interest in the Society would be just the same as ever, and he hoped to do what he could for it in the future as in the past.

The public meeting then terminated.

The following Officers of the Society for the year 1903-4 were elected at this and a subsequent meeting of the Council:—President—Professor Johnson Symington, M.D., F.R.S.; Vice-Presidents—Sir Robert Lloyd Patterson, D.L., J.P., F.L.S.; Wm. Swanston, F.G.S.; Rev. T. Hamilton, D.D., LL.D., M.A., and Robert Young, J.P., C.E. Hon. Treasurer—W. H. F. Patterson. Hon. Librarian—J. H. Davies. Hon. Secretary—Robert M. Young, J.P., M.R.I.A.

EDUCATIONAL ENDOWMENTS (ACT), 1885, 48 and 49 Vic., ch. 78.

The Account of the Council of the Belfast Natural History and Philosophical Society for the year ended, 30th April, 1903.

Dr. | **Cr.**

CHARGE.

To Balance as per last Account		£16 16 7
,, Amount of Donations, Bequests, and other Endowments, received in the year ended 30th April, 1903 ...		136 1 0
,, Amount of Subscriptions received in the year ended 30th April, 1903		112 10 0
,, Amount of Dividends received in the year ended 30th April, 1903		16 17 11
,, Amount of Rents received in the year ended 30th April, 1903		28 4 6
,, Amount of Fees received in the year ended 30th April, 1903		0 11 6
,, Amount realized by Sales in the year ended 30th April, 1903		6 8 9
,, Amount of Miscellaneous Receipts in the year ended 30th April, 1903 (not included in the foregoing) viz:—		
Carriage Refunded Belfast Steamship Co. ..	£0 5 11	
Door Admission Fees during year	21 16 8	
,, ,, ,, ,, Easter ..	20 2 4	
,, ,, &c.—Coronation Holidays ..	2 2 3	
		44 7 2
		£361 17 5

DISCHARGE.

By Amount of Payments made in the year ended 30th April, 1903, under the following headings:—		
Maintenance of Premises, &c.	£72 11 7	
Rent and Taxes, &c.	28 3 10	
Salaries	104 0 5	
		£204 15 10
Other Payments, viz:—		
Printing and Stationery	4 16 4	
Advertising	10 17 10	
Postage and Carriage	4 8 7	
Fire and Gas	16 12 2	
Insurance—£2 12s 6d, £1 19s 9d	4 12 3	
Stamping Transfer Forms	0 12 0	
Purchase of Shares	13 0 0	
Subscription *Ulster Journal Archæology* ..	0 10 0	
,, *Irish Naturalist*	2 2 0	
Printing Report	14 11 6	
Lecturers' Travelling Expenses	2 18 4	
J. Brown—Lecture Expenses	1 17 7	
Tickets and Boxes for Specimens ..	7 3 0	
Auditor's Fee	1 1 0	
Coronation Expenses	3 10 1	
Easter Expenses	5 11 1	
Hire of Lantern	2 9 0	
Sundries	1 15 10	
		98 8 7
Total Payment		303 4 5
,, Balance in favour of this Account on 30th April, 1903 ..		58 13 0
Total		£361 17 5

N.B.—Besides the above Balance there is a sum of £400 standing to the credit of this Account in the York Street Flax Spinning Co., Ltd., $4\frac{1}{2}$ per cent. Debenture Stock.

We certify that the above is a true Account.

ROBERT M. YOUNG, Governor.

W. H. F. PATTERSON, Accounting Officer.

Dated this 27th of May, 1903.

I certify that the foregoing Account is correct.

J. F. MAYNE, Auditor.
19th day of June, 1903.

DONATIONS TO THE MUSEUM, 1902-1903.

From Mrs. Carroll.

A mounted specimen of the Gannet (*Sula alba*).

From Mr. Robert Bell.

A fine specimen of Natrolite from Trap rock at Whitewell.

From Sir James Musgrave, D.L.

A mounted specimen of the Golden Eagle (*Aquila chrysætos*) shot in County Donegal.

From Sir R. Lloyd Patterson, D.L., F.L.S.

A mounted specimen of the Crane (*Grus cinerea*).

From Mr. Robert Young, J.P.

Two vertebral joints of an *Icthyosaurus* from the Lias at Woodburn, County Antrim.

From The Egypt Exploration Fund.

Numerous specimens of ancient pottery and other objects obtained by recent researches and excavations at Abydos.

From Mr. Robert Patterson, M.R.I.A., F.Z.S.

Two large specimens of Salmon (*Salmo salar*) from Glenarm River, pictorially mounted in glazed cases; also many specimens of Irish birds, including the Common Buzzard (*Buteo vulgaris*), Redbreasted Merganser (*Mergus serrator*), and a Velvet Scoter (*Œdemia fusca*) shot in Belfast Lough.

From Mr. George A. Carruthers, Weymouth.

Stem of a Cycad from the "Dirt Bed" at Portland, Dorset. Portion of fossil tree stem from the Oolitic limestone of Portland. Three gigantic Ammonites. Casts of oysters, and of *Trigonia*, and of *Cerithium portlandicum* from the same bed. Two fossil oysters from the Oxford clay at Weymouth, also specimen of crystallised carbonate of lime.

From MESSRS. J. P. CORRY & CO.

Two planks of elm in which a stake of ash is included. The stake had been fastened by pegs to the young elm tree, and the elm has grown around the ash stake and completely enfolded it.

From MR. W. D. BARRETT.

A specimen of lead ore (*Galena*) from Co. Kerry.

From MR. R. M. PATTERSON.

A specimen of the giant puff bull (*Lycoperdon giganteum*).

From MR. CHARLES HALLIDAY, BANBRIDGE.

One of the old six-barrelled revolver pistols.

From MR. VICTOR COATES, D.L.

The Skin of a Vulture (*Gypætos meridionalis*) from South Africa.

From MR. H. MARSHALL, NEWRY.

Preserved specimens of Otter, Woodpecker, Water Rail, etc.

From MR. F. B. SIMMS.

Eggs of Gannet from the Bass Rock, and Eggs of Tern from Copeland Islands.

From MR. WM. R. SINCLAIR.

Skin of a reptile (*Iguana ?*) from South Africa.

From MR. JAMES SLOAN.

The upper stone of a Quern.

From MISS REA.

A large collection of geological specimens.

From MISS M. K. ANDREWS.

A framed photograph of coast erosian at Cultra.

From MR. ROBERT WELCH.

A specimen of the curiously perforated limestone at Lough Corrib.

From Mr. William Swanston, F.G.S.

A numerous series of fossil specimens.

From Mr. S. A. Stewart, F.B.S

Glaciated limestone from Castle Espie, and a number of fossils.

From Messrs. R. J. Ussher, Nevin Foster, and John Cottney.

A large number of eggs of Irish birds.

From Mr. Joseph Wright, F.G.S.

A large number of mounted specimens of Irish Foraminifera.

From Mr. Granby Higginbotham.

Specimen of a fossil plant from the Coal Measures.

ADDITIONS TO THE LIBRARY, 1ST MAY, 1901, TILL 1ST MAY, 1902.

Received from

ADELAIDE.—Memoirs of the Royal Society of South Australia. Vol. 2, part 1, 1902. Transactions, vol. 26, parts 1 and 2, 1902.
Presented by the Society.

BASEL.—Verhandlungen der Naturforschenden Gesellschaft in Basel. Vol. 13, part 1, 1901, and part 2, 1902; vol. 14, 1901; and vol. 15, part 1, 1903; also Zur Erinnerung an Tycho Brahe, 1901.
The Society.

BELFAST.—Catalogue of Early Belfast Printed Books, second supplement to third edition.
The Linen Hall Library.

BERGEN.—Bergens Museums Aarbog for 1902, parts 1 and 2, 1902, and part 3, 1903; also Crustacea of Norway, vol. 4, parts 7—12, 1902, and parts 13 and 14, 1903. *Bergen Museum.*

BIRMINGHAM.—Proceedings of the Birmingham Natural History and Philosophical Society. Vol. 11, part 2, 1902. *The Society.*

BOSTON, U.S.—Proceedings of the Boston Society of Natural History. Vol. 29, No. 15, 1900, Nos. 16—18, 1901, and vol. 30, Nos. 1 and 2, 1901; also Occasional Papers, No. 6, 1901.
The Society.

BOULDER, COLORADO.—College Studies. Vol. 1, Nos. 1 and 2, 1902; and Quarto Centennial Celebration of Colorado University, 1902.
Colorado University.

BREMEN.—Abhandlungen vom Naturwissenschaftlichen Verein zu Bremen. Vol. 17, part 2, 1903.
The Society.

BRESLAU.—Zeitschrift für Entomologie vom Verein für Sclesiche Insektenkunde zu Breslau. New series, part 27, 1902. *The Society.*

BRIGHTON.—Annual Report and Abstract of Papers of Brighton and Hove Natural History and Philosophical Society, 1902. *The Society.*

BRUSSELS.—Anales de la Société Royale Malacologique de Belgique. Vol. 36, 1902. *The Society.*

BUENOS AYRES.—Annales de Museo Nacional de Buenos Aires. Ser. 2, vol. 7, 1902. *The Director.*

CALCUTTA.—Memoirs of the Geological Survey of India. Vol. 33, part 3, 1902; vol. 34, part 2, 1902; vol. 35, part 1, 1902. Palæontologia Indica, ser. 16, vol. 2, parts 1—3, 1902; and General Report for 1901-1902. *The Director of the Survey.*

CAMBRIDGE.—Proceedings of the Cambridge Philosophical Society. Vol. 11, parts 5—7, 1902; and vol. 12, parts 1 and 2, 1903. *The Society.*

CAMBRIDGE, MASS.—Bulletin of the Museum of Comparative Zoology at Harvard. Vol. 38, No. 7, 1902; vol. 39, Nos. 2—5, 1902; vol. 40, Nos. 1—3, 1902; and Nos. 4 and 5, 1903; also Annual Report, 1902. *The Keeper of the Museum.*

CASSEL.—Abhandlungen und Bericht (47) des Vereins fü Naturkunde zu Kassel, 1902. *The Society.*

CHERBURG.—Memoires de la Société Nationale des Sciences Naturelles et Mathematiques de Cherbourg. Ser. 4, vol. 33, fasc. 3, 1902. *The Society.*

CHICAGO.—Bulletin of the Chicago Academy of Sciences. Vol. 2, Nos. 3 and 4, 1900. *The Academy.*

CHRISTIANIA.—Forhandlinger i Videnskabs Selskabet i Christiania for year 1901.
The Royal Norske Frederiks University.

CINCINNATI.—Bulletin of the Lloyd Library. Nos. 4 and 5, 1902. *The Messrs. Lloyd.*

DANTZIC.—Schriften der Naturforschenden Gesellschaft in Danzig. New series, vol. 10, part 4, 1902. *The Society.*

DAVENPORT, IOWA.—Proceedings of the Davenport Academy of Sciences. Vol. 8, 1901. *The Academy.*

DUBLIN.—Scientific Transactions of the Royal Dublin Society. Series 2, vol. 7, parts 14—16, 1902; vol. 8, part 1, 1902; and vol. 9, part 5, 1903; also Economic Proceedings, vol. 1, part 3, 1902. *The Society.*

EDINBURGH.—Proceedings of the Royal Physical Society. Vol. 14, part 4, 1901. *The Socety.*

ELBERFELD.—Jahresbericht des Naturwissenschaftlichen Vereins in Elberfeld. Part 10, 1903. *The Society.*

EMDEN.—Jahresbericht der Naturforschenden Gesellschaft in Emden for 1900-1901. *The Society.*

GENOA.—Rivista Ligure di Scienze Lettere ed Arti. Fasc. 2—6, 1902, and fasc. 1, 1903. *The Society di Letture e Conversazioni ed Art.*

GIESSEN.—Thirty-third Bericht der Oberhessichen Gesellschaft für Natur und Heilkunde, 1902. *The Society.*

GLASGOW.—Transactions of the Natural History Society of Glasgow. New series, vol. 6, part 2, 1902. *The Society.*

" Proceedings of the Royal Philosophical Society of Glasgow. Vol. 33, 1902. *The Society.*

GOTHENBURG.—Goteborg's Kungl Vetenskaps Och Vitterhets-samhalles Handlingar. Part 4, 1898. *The Society.*

HAMBURG.—Abhandlungen aus dem Gebiete der Naturwissenschaften. Herausgegeben vom Naturwissenschaftlichen Verein in Hamburg. Vol. 17, 1902. *The Society.*

Iglo.—Jahrbuch des Ungarischen—Karpathen Vereins. 29th year, 1902. *The Society.*

Kiew.—Memoirs of the Society of Naturalists of Kiew. Vol. 17, part 1, 1901 ; and part 2, 1902. *The Society.*

Lausanne.—Bulletin de la Société Vaudoise des Sciences Naturelles. Vol. 38, Nos. 143—145, 1902 ; also Observationes Meteorologiques, 1902. *The Society.*

Lawrence.—Bulletin of the University of Kansas, Science. Vol. 1, Nos. 1—4, 1902. *The University.*

Leeds.—Eighty-second Annual Report of Leeds Philosophical and Literary Society, 1902. *The Society.*

Leipsic.—Mitteilungen des Vereins für Erdkunde zu Leipzig, 1901. *The Society.*

Lima.—Boletin del Cuerpo de Ingenieros de Minas dei Peru. Nos. 1 and 2, 1902. *The Director.*

London.—Quarterly Journal of the Geological Society of London. Vol. 58, parts 2—4, 1902 ; and vol. 59, part 1, 1903 ; also List of Fellows, and Geological Literature, 1902. *The Society.*

, Series of British Museum Guide Books as under. Guide to Mammalia ; to Reptiles and Fishes ; to British Echinoderms ; to Shells and Starfish ; to Sowerby's Models of Fungi ; to the Mycetozoa; to Coral Gallery ; to Fossil Reptiles and Fishes ; to Fossil Invertebrata and Plants (2 parts) ; Introduction to Study of Meteorites ; to Study of Rocks ; to Study of Minerals ; Guide to Mineral Gallery, and Students' Index to the Minerals ; also ten pamphlets of Directions for Collectors. *The Director.*

Journal of the Royal Microscopical Society. Parts 148—151, 1902 ; and 152 and 153, 1903. *The Society.*

LONDON.—Transactions of the Zoological Society of London. Vol. 16, parts 5—7, 1902. Proceedings for 1901, vol. 2, part 1; and 1902, vol. 1, parts 1 and 2; vol. 2, part 1; also Index for 1891-1900. *The Society.*

MADRAS.—Administration Report of the Government Museum and Public Library, 1901-1902.
The Superintendent of the Central Museum.

MANCHESTER.—Journal of Manchester Geographical Society. Vol. 17, Nos. 7—12, and Supplement, 1901; vol. 18, Nos. 1—3, 1902, and Supplement for 1896. *The Society.*

" Transactions of Manchester Geological Society. Vol. 27, parts 10, 11, 12, 13, and 17, 1902. *The Society.*

" Annual Report and Transactions of Manchester Microscopical Society, 1900-1901. *The Society.*

MARSEILLES.—Anales de la Faculté des Sciences de Marseille. Vol. 12, 1902. *The Librarian.*

MELBOURNE.—Proceedings of the Royal Society of Victoria. New series, vol. 14, part 2, 1902; vol. 15, part 1, 1902; and part 2, 1903. *The Society.*

MEXICO.—Boletin del Instituto Geologico de Mexico. No. 15, 1902, and No. 16, 1902. *The Institute.*

" Boletin Mensual del Observatorio Meteorologico Central di Mexico. August till November, 1901, and January, 1902. Informe (text and atlas) 1901-1902. Anuario, No. 23, 1902. *The Director.*

MILWAUKEE.—Bulletin of Wisconsin Natural History Society. New series, vol. 2, No. 4, 1902. *The Society.*

MONTEVIDEO.—Anales del Museo Nacional de Montevideo. Vol. 4, part 1, 1902. *The Director.*

MOSCOW.—Bulletin of the Imperial Society of Naturalists of Moscow. Nos. 3 and 4, 1902, and No. 3, 1903. *The Society.*

NANTES.—Bulletin de la Société des Sciences Naturelles de l'Ouest de la France. Series 2, vol. 1, parts 3 and 4, 1901 ; vol. 2, parts 1 and 2, 1902 ; also Table des Matières de la Premiére série, 1891 1900. *The Society.*

NEW YORK.—Annals of New York Academy of Sciences. Vol. 14, part 2, 1902. *The Academy.*

„ Bulletin of the American Geographical Society. Vol. 24, Nos. 1—5, 1902, and vol. 25, No. 1, 1903. *The Society.*

NOTTINGHAM. — Report and Transactions of Nottingham Naturalists' Society, 1901-1902. *The Society.*

ODESSA.—Memoirs of the Society of Naturalists of New Russia. Vol. 24, part 1, 1901. *The Society.*

OTTAWA.—Contributions to Canadian Palæontology. Vol. 2, part 2 (Fossil insects), 1900 ; vol. 4, part 2 (Palæozoic Corals), 1901 ; and vol. 3 (quarto), 1902 ; also Catalogue of the Marine Invertebrata of Eastern Canada, 1901. *The Director of the Survey.*

PADUA.—Atti della Società Veneto Trentina di Scienze Naturali. Series 2, vol. 4, fasc. 2, 1902. *The Society.*

PHILADELPHIA.—Proceedings of Philadelphia Academy of Natural Science. Vol. 54, part 1, 1902. *The Academy.*

„ Proceedings of the American Philosophical Society. Vol. 41, Nos. 168—170, 1902. *The Society.*

„ Ressources Vegetales des Colonies Francaises, by Gustavo Niederlein, Chef de Department Scientifique des Philadelphia Museums. *The Author.*

PISA.—Atti della Società Toscana di Scienze Naturali, Processa Verbali. Vol. 13, January, 1902—January, 1903. *The Society.*

ROME.—Atti della Reale Accademia dei Lincei. Vol. 11, semestre 1, fasc. 7—12, 1902 ; semestre 2, fasc. 1—12, 1902 ; vol. 12, semestre 1, fasc. 1—6, 1903 ; and Rendiconto dell' Adunanza Solenne di 1st Guigno, 1902. *The Academy.*

" Bollettino della Società Zoologico Italiana. Series 2, vol. 3, fasc. 1—3, 1902. *The Society.*

SAN FRANCISCO.—Occasional Papers of California Academy of Sciences, No. 8, 1901. Proceedings (Zoology), vol. 2, Nos. 7—11, 1901 ; and vol. 3, Nos. 1—4, 1901-1902. *The Academy.*

ST. LOUIS.—Thirteenth Annual Report of Missouri Botanical Garden, 1902. *The Director.*

STAVANGER.—Stavanger Museum Aarshefte for 1891. *The Museum Trustees.*

STETTIN.—Bericht der Gesellschaft für Volker und Erdkunde zu Stettin, 1902. *The Society.*

STIRLING.—Transactions of Stirling Natural History and Archælogical Society, 1902. *The Society.*

STOCKHOLM.—Handlingar of the Royal Swedish Academy. Vol. 35, 1902. Bihang, vol. 27, parts 1—4, 1902. Ofversigt, No. 58, 1901, and No. 59, 1902. *The Academy.*

SYDNEY—Science of Man (Journal of the Royal Anthropological Society of Australasia). New series, vol. 5, Nos. 3—12, 1901-1902. *The Editor.*

TOKYO.—Mittheilungen der Gesellschaft für Natur—und Volkerunde Ostasiens. Vol. 8, part 3, 1902 ; and vol. 9, part 1, 1902 ; also Supplement, No. 1, 1902, and Festschrift, 1902. *The Society.*

TORONTO.—Transactions of the Canadian Institute. Vol. 7, part 2, 1902, and Proceedings, vol. 2, part 5 1902. *The Institute.*

UPSALA.—Bulletin of the Geological Institution of the University of Upsala. Vol. 5, part 2, No. 10, 1901.
The University.

VIENNA.—Verhandlungen der Kaiserlich-Königlichen Zoologisch-Botanischen Gesellschaft in Wien. Vol. 52, 1902. *The Society.*

" Verhandlungen der Kaiserlich-Königlichen Geologischen Reichsanstalt. Nos. 3—18, 1902, and Nos. 1—4, 1903. *The Society.*

WASHINGTON.—Year-book of the Department of Agriculture, 1901, and North American Fauna, No. 22, 1902.
The Secretary of the U.S. Dept. of Agriculture.

" Bulletin of the Bureau of Ethnology. No. 26, 1901. *The Director of the Bureau.*

" Twenty-first Annual Report of the United States Geological Survey, parts 5 and 7, and Atlas, 1899-1900. Monographs, No. 41, 1902. Bulletin of the Survey, Nos. 177—190, 1901-1902, and Nos. 192—194, 1902. Mineral Resources of the United States, 1902. Reconnaissances in Cape Nome Region, Alaska, 1901. Also Geology and Mineral Resources of Copper River District, Alaska, 1901.
The Director of the Survey.

" Annual Reports of the Smithsonian Institution for 1900 and 1901. Smithsonian Contributions to Knowledge, No. 1309, 1901. Smithsonian Miscellaneous Collections, Nos. 1312—1314, 1902 ; also 1174 and 1259, 1902.
The Smithsonian Institution.

" The American Monthly Microscopical Journal. Vol. 22, Nos. 8, 9, 10, and 12, 1901, and vol. 23, Nos. 1—4, 1902. *The Publisher.*

WASHINGTON.—Bulletin of the Philosophical Society of Washington. Vol. 14, pp. 179—204, 1902.
The Society.

YORK.—Annual Report of the Yorkshire Philosophical Society for 1902. *The Society.*

ZURICH.—Vierteljahrsschrift der Natursforschenden Gesellschaft in Zurich. Parts 1 and 2, 1902.
The Society.

BELFAST

NATURAL HISTORY & PHILOSOPHICAL SOCIETY

SESSION 1902-1903.

5th November, 1902.

THE LIQUEFACTION OF GASES.

Inaugural Address by the President, J. Brown, F.R.S.

(*Abstract.*)

Before taking up the subject proper of my address, will you permit me to express my very grateful appreciation of the honour conferred upon my unworthiness by your Council in electing me as your President for a third term? There is no honour which I value more highly, nor any commendations which appeal to me more than such as come from our own Society, in which I have for the last twenty years or more taken a lively interest and an active part.

In dealing with the subject generally of liquefied gases in this place I feel that I have the privilege of entering on a field made famous by the work of one of our own citizens in our own town. I think it was my friend Professor Fitzgerald who remarked that if the name of our city were to be mentioned in any university in the civilised world the name of one man,

and one only, would be recalled by the word "Belfast." It would not be a name connected with our boasted manufactures, our great political lights, or our popular celebrities of any kind. It would be the name of Thomas Andrews, the fame of whose work on the continuity of the liquid and gaseous states is of course world-wide.

Before Andrews's time, we find that in 1823 Faraday had succeeded in liquefying chlorine, sulphuric acid, and some other gases. Faraday, however, did not succeed in liquefying oxygen, hydrogen, nitrogen, &c.

In 1861 Andrews subjected these intractable gases to very great pressure, also without success, but on more easily condensible gases his subsequent work had a value far exceeding this in scientific interest.

In order to fix our ideas as to the conditions necessary for the liquefaction of gases let me point as an illustration to the homely matter of water boiling under ordinary conditions. Evidently heat is required. It is the tendency of heat to produce vapour or gas from liquid. Conversely we may conclude it is a tendency of cooling to produce liquid from a gas or vapour like steam. Here, however, is only half the matter. When water boils in ordinary conditions it is under the atmospheric pressure of 15lb. per square inch on its surface, and the vapour rising from it has to lift this 15lb. off before it can form. As a matter of experiment we know that it will not lift this pressure till the temperature is raised to 100 degrees C. It would be natural to expect, however, that if we lift this atmospheric pressure off by other means a less temperature would suffice for converting the liquid into gas. We shall therefore not be very much surprised to see water boiling and freezing at the same time. Having exhausted the air from above the water in a glass vessel, you see it boiling violently, although quite cold enough to form ice, which is presently seen on its surface.

From this experiment we draw the conclusion that the essening of pressure tends to form gas from liquid, and

conversely that increase of pressure would tend to form liquid from gas. We also note incidentally that evaporation is here also attended by loss of heat, producing in this case actual freezing of the liquid. Thus we see that the two conditions tending towards liquefaction of gases are pressure and cold.

Before Andrews's time it was tacitly assumed that any defect in one of these could be made up for by increasing the other. If too little cold, more pressure would cause liquefaction. Andrews, however, discovered that for each gas there was a certain temperature above which no amount of pressure would liquefy that gas. This temperature he called the critical temperature for that particular gas. Below that temperature and at a sufficient pressure, called the critical pressure, the gas would liquefy with a decrease of volume. Above it no liquefaction could be observed ; yet when not much above it there was as the pressure increased a somewhat more rapid decrease in volume, than would correspond with the behaviour of what is called a perfect gas. Yet, again, when above the critical point, and therefore in a gaseous state, the gas, when reduced to about the volume which it would have occupied when liquefied at a lower temperature, yielded only slightly to further pressure. As regards its elasticity, it behaved then as a liquid. These researches were carried out with carbonic acid as an experimental agent, and in them is illustrated what Andrews aptly called the continuity of the gaseous and liquid states of matter. As he says, "From carbonic acid as a perfect gas to carbonic acid as a perfect liquid the transition may be accomplished by a continuous process."

Andrews, who began with an attempt, unsuccessful as it was, to merely liquefy the most refractory gases—oxygen, hydrogen, nitrogen, etc.—was thus led aside to a path rich in scientific interest—perhaps richer even than that which he set out to pursue. This was left to later investigators.

In 1877 Pictet achieved the liquefaction of oxygen by combined pressure and cold, produced by elaborate and costly machinery. A few days only after Pictet's success Cailletet

announced a similar achievement. Following oxygen, all the other gases known at that period soon yielded likewise. About the case of hydrogen it is true doubts and difficulties seem to hang. At all events six years elapsed before Wroblewski and Olszewski obtained hydrogen in the form of a static liquid, and to collect liquid hydrogen in some quantity, as Professor Dewar remarks, has taken twenty years from the date of Pictet's experiments.

Though Siemens had suggested the principle earlier, it was about 1895 that Linde, and also Hampson, devised perfect and simple apparatus. It is true that others in the meantime were approaching perfection, Dewar, for instance, having described in 1886 an apparatus embodying this principle. The chief difficulty is the production of a sufficient degree of cold. Lowering of temperature is, in modern apparatus, attained by a device which I shall try to explain in a simple way. In the antique apparatus for obtaining fire known as the fire syringe (a specimen of which has been kindly lent us by Mr. Robert May, whose interesting collection of antique candlesticks is at present on view in the Free Library) heat is obtained by the compression of air. The syringe consists of a strong brass tube with an airtight plunger reaching nearly to the bottom of the tube. On driving the plunger rapidly down, the air beneath is so heated as to set fire to a piece of touch cotton (cotton wool treated with saltpetre and sulphur or with solution of phosphorous), which has previously been attached to the end of the plunger. When the plunger is withdrawn the air, which has been hot enough to set fire to our cotton wool, cools again. To do so it absorbs heat. From this simple experiment we conclude generally that air in expanding cools itself. Thus by the device of first compressing air, and, as it were, squeezing some of its heat out, and then allowing it to expand again, we cool it below the temperature at which we started.

This is the first process in the air liquefying apparatus. Air is compressed in water-cooled pumps to 120 atmospheres, say 1,700lb. per square inch, further cooled by passing through

coils of tube immersed in water, and finally allowed to escape through a specially constructed valve, whereby in expanding it cools itself further, though not enough for the purposes of liquefaction. For this there is necessary the so-called self-intensive principle. Just before the air escapes by the valve it has to pass through a coil containing very many turns of tube contained in a non-conducting casing. Through this casing and among the coils of tube the recently escaped and therefore cold air circulates, imparting its cold to the coils, and therefore to the compressed air circulating in them. We have thus a continuous interacting process of cooling, by which in a short time the air in the coils is reduced to a liquefying temperature. This is the self-intensive principle used by Linde, Dewar, Hampson, etc., for liquefaction of air, and finally by Travers for liquefaction of hydrogen, a much more difficult matter.

It would be quite impracticable to keep liquid air in closed vessels because of the enormous pressure that would result when the liquid, by absorbing heat from the surrounding atmosphere through the walls of the vessel, would evaporate and regain its gaseous form. In an ordinary open glass vessel it evaporates in time, of course ; but if we reduce the influx of heat by surrounding the vessel with a non-conducting envelope we may retard this evaporation. The best non-conducting envelope known is a vacuous or highly-exhausted space, consequently what are called vacuum jacketed vessels are employed—i.e., the glass tube or flask containing the liquid is surrounded by a second larger glass tube or flask, sealed on so that the interspace can be exhausted of air. Through this space conduction of heat is very slight. Radiation of heat into the vessel is prevented by silvering the interior between the two vessels, and so reflecting the heat rays that strike upon it. The invention of these vessels is claimed by Professor Dewar.

For the opportunity of seeing and experimenting with liquefied air we are indebted to the very great kindness of Mr. Richard J. Moss, of the Royal Dublin Society, who with the greatest cordiality acceded to a request from me for a supply of

the liquid. On a former occasion when sending me a supply for use in my own laboratory, Mr. Moss expressed a doubt if the Dublin atmosphere would suit Belfast, but on this occasion he expressed the conviction that an abundant supply of some cooling medium will not be out of place on Guy Fawkes Day in the North. May I assure Mr. Moss, on your authority, that it is not by any means out of place, and that we tender our warmest thanks for this coldest of gifts?

Liquid air is a clear, transparent fluid. The boiling point is about 190° to 200° under atmospheric pressure. The experiments that can be performed with liquid air depend chiefly on the effects produced by this very low temperature. Poured upon water, liquid air floats, forming a cup of ice, in which it boils. Immersed in liquid air, mercury may be frozen, and forms a mercury casting, which can be forged cold into a hook, on which we may suspend a weight, till the warmth of the surrounding atmosphere melts it into liquid drops, when the weight of course fails. Alcohol may be frozen, ice hardened till it is said to cut glass, and indiarubber becomes brittle like a pipe stem. Sulphur, vermilion, and a solution of cobalt chloride in alcohol lose their colours. The electric resistance of metals is decreased manifold. Owing to the fact that the nitrogen in air is more volatile than the oxygen, it evaporates first, and in liquid air which has been standing some time the residue is chiefly oxygen. On this account a process of obtaining oxygen sufficiently pure for many purposes has been proposed. To illustrate this a shaving splinter of wood burns up brightly over such stale liquid air. Felt or cotton wool soaked in the liquid burns with explosive violence. A jet of hydrogen will burn under the surface of liquid oxygen. Liquid air has been proposed as a carrier of power by using it to drive motors of the steam engine type. Here is an illustration where a tube of liquid air enclosed in an appropriate closed vessel gives off air at sufficient pressure to drive the model engine, and on the screen is a slide of a motor so driven. Here however convenient in some respects the process might be, the question of

economy comes in. On this point Dr. Hampson states that 1lb. liquid air at 1d. will expand to 800 volumes at atmospheric pressure ; 1lb. steam to 1,700 volumes. One pound steam can be made under good conditions by the combustion of 1-10lb. of coal, or at a cost of 1-120 of a penny, putting coal at 15s per ton. Therefore the power contained in 1lb of liquid air at 1d is, roughly speaking, equal to that contained in ½lb. of steam at 1-240ths of a penny. Of course if liquid air could be produced at 1-240ths of its present cost. allowing for loss in carrying about, it could very favourably compete with steam.

Some years ago a Mr. Tripper, of the United States, claimed that he could make it for less than nothing. We have heard nothing of Mr. Tripper lately.

Liquid air has also been proposed as a cooling agent. Much tall talk was indulged in by the American Press in this connection also. Hampson points out that liquid air would have only 1-10th the cooling power of ice weight for weight, and, as ice is usually less than 1d. per pound, the price of liquid air, the inefficiency is so much the more evident. Liquid air or oxygen as an explosive has been proposed. When mixed with petroleum and infusorial earth it explodes violently. Probably the difficulty of transporting it comes in the way here.

Liquid hydrogen in sufficient quantity to be properly observed and investigated seems to have been first obtained by Professor Dewar in 1898. It is a clear, colourless liquid, perfectly transparent, and about 1-10th the specific gravity of water. It boils at —250 deg. C., under atmospheric pressure, or within 23 deg. of absolute zero. As a cooling agent, it will lower temperature to within 13 deg. to 15 deg. of absolute zero. Its critical temperature is —240 deg., and critical pressure 13·3 atmospheres. Professor Dewar considers the step from the liquefaction of air to that of hydrogen is relatively as great in the thermo-dynamic sense as that from chlorine to liquid air. Some idea of the difficulty of its production may thereby appear. The solidification of the gases is the next step beyond liquefaction. Atmospheric air

was frozen by Professor Dewar in 1893. A litre of liquid air subjected to exhaustion in a silvered vacuum vessel yielded about half a litre of a colourless, transparent solid, consisting of a nitrogen jelly containing liquid oxygen. Solid oxygen is obtained by subjecting liquid oxygen to cooling by immersion of the tube containing it in boiling hydrogen. It is clear blue ice. Solid hydrogen has been produced by the same kind of process. It is a transparent ice.

The really important uses of liquefied gases are comprised in their application to low temperature research, providing as they do a means of cooling other bodies hitherto unattainable. We may glance at a general view of this part of the subject. It was at first supposed from the change in the electric resistance of metals produced at this temperature that all metals would become perfect conductors at absolute zero. Further cooling by liquid hydrogen showed, however, that a certain amount of resistance would still exist at 0 deg. absolute. Phosphorescence is much increased by the cold of liquid air, and much more by that of liquid hydrogen. Chemical affinity is almost abolished by cold. Potassium, which bursts into flame on water, remains inert on liquid air or oxygen.

Fractionation by distillation at these low temperatures has been effectively employed by Professor Ramsay and Dr. Travers in 1898 for the extraction from the atmosphere of the new gases, krypton, neon, and xenon, following on the discovery of argon in 1895 by Lord Rayleigh, and helium later.

In connection with the last mentioned, it is interesting to recall how the name arose. In the spectroscopic examination of the sun one line was observed which could not be detected in any terrestrial substance. It was therefore supposed to be peculiar to the sun, and so called the helium line. Subsequently, however, it was proved to be like the other constituents of the sun, terrestrial also, a gas more volatile than hydrogen, and which has not yet been liquefied and solidified.

The influence of very low temperatures an the vital force of living organisms has also been examined. The cold of liquid air

has no apparent effect on bacteria. After twenty hours at —190 deg. no diminution in any of their powers was perceptible. Phosphorescent organisms under alternate cooling and thawing showed a remarkable instance of suspension and renewal of vital processes. Cooled down by liquid air, they became non-luminous, but phosphorescence began again with its usual strength when removed into ordinary conditions. In a paper communicated to the Royal Society last August Dr. M'Fadyen states that several forms of bacteria, including typhoid bacillus, survived perfectly an exposure to —190 deg. C. for six months. Even at the temperature of liquid hydrogen (—252 deg.) these much-enduring though minute organisms suffered no injury.

Professor Fitzgerald moved a hearty vote of thanks to the President who, he said, had given them a most profitable evening, and whose experiments with liquid air they had all witnessed with wonder and delight. They all appreciated, too Mr. Brown's tribute to Professor Andrews and his work. To Dr. Moss, of Dublin, and to Mr. Brown's son who had acted so efficiently as his assistant, their best thanks were also due.

Mr. R. M. Jones, in seconding the motion, said Mr. Brown, in addition to being an eminent scientist, was one of the most public-spirited men in Belfast. He had introduced them to many new and interesting discoveries, including the motor-car, wireless telegraphy, and that very ingenious invention of his own for the improvement of our roads. That evening he had introduced them to liquid air, and shown them some of its marvellous properties, in addition to giving them a wonderfully able and concise history of modern research in connection with the liquefaction of gases.

The vote was passed by acclamation, and briefly replied to by the President.

On the motion of Mr. W. S. Swanston, seconded by Mr. Robert Patterson, authority was given to dispose of some duplicate specimens in the Museum.

2nd December, 1902.

PROFESSOR REDFERN, M.D., F.R.C.S.I., in the Chair.

RECENT FISHERY RESEARCH,

BY PROFESSOR GREGG WILSON, D.SC.

(*Abstract.*)

PROFESSOR WILSON said the subject of sea fisheries ought to be an interesting one to every member of a British audience. He wanted to remind them that the British fisheries were worth a great deal of money. They yielded the fishermen something like £10,000,000 a year. He was sorry a very small part of that money was gained by Irish fishermen—some £300,000 or £400,000. He ventured to hope that the fisheries were worth a great deal more than £10,000,000 to the consumers. He wished to call their attention to the work done by scientific men in recent years in connection with preserving and improving the fisheries.

First, he wanted them to grasp very firmly that their fish area was a small one. The great bulk of the ocean was deeper than 2,000 metres, or yards. For a long time it was believed that there was no life in the deep seas, in the waters beyond about 100 fathoms. One of the most prominent professors of last century maintained that fact, but that idea was got rid off. It was first really proved by the electric cables that had been

laid in deep water. They were lifted after a time for repairs, and were found to be covered with marine organisms. This proved the fact that there was life in the depths of the ocean, and in this connection he could not refrain from referring to the magnificent work that was done by Sir W. Thompson, a former professor of Queen's College, who carried out work on the Challenger, the results of which had been given to the world in many volumes.

He was particularly anxious that they should grasp the fact that deep-sea life was not the kind of life that was any use to them. The lecturer then called attention to characteristics of some of the curious looking creatures that they found in the deep sea. He showed that some of these were provided with luminous organs, as the water beneath 100 fathoms is completely dark, and he also pointed out that they were so formed as to be able to exist under the great pressure to which they were subjected so far beneath the surface. Those physical conditions prevented fish living in the higher waters migrating to the lower, and vice versa. Fish taken from those deep waters practically exploded by being brought to the surface and relieved of the pressure which they were formed to resist. The ordinary fisherman in the North Sea knew how to minimise the effects of slight change of pressure. When they took a cod out of even twenty fathoms of water, and wished to keep it alive, they resorted to the precaution—at least they used to —of running a needle into the bladder and letting out some of the gas or air, so that the bulk of the fish might diminish rapidly and accommodate its size to the lesser pressure of surface water. Another preventative from the passage of fish from higher to lower waters, and lower to higher, was the difference in temperature. They had found that the temperature in those deep waters was very little above freezing point.

After alluding to figures which showed a decline in some of our fisheries, especially those for turbot and soles, the lecturer said that fall in the fisheries took place in spite of the fact that there was an enormous increase of fishing apparatus at work.

Their great steam trawlers went further afield than they did a few years ago. They were managing to take about the same quantity of fish out of the water by fishing with an enormous amount of apparatus. They had got to face the fact that there was at least the danger of a very serious decline in their fisheries. On the recognition of that fact there was a sudden impulse to study the question of their fisheries. The Americans, Canadians, Norwegians, Danes, the British, especially the Scotch, had been engaged on that question, and he would like to indicate to them the sort of work that had been going on amongst scientific men who had put themselves to consider the fishery question, and he hoped that sooner or later they would do some fishery work in this district. In the first place, they had been studying fish eggs and the spawning of fish.

The most important fact discovered about the spawning habits of fish was discovered in 1864. That was the fact that most of their food-fishes produce eggs that float. Why was it that they did not see them? Because they were like little beads of glass, they were so transparent. A false idea existed that the spawn of most fish was produced near the shore, whereas many of the best spawning grounds were far from the shore, and legislation to protect the same would require to take that fact into consideration.

He advocated the provision of fish hatcheries in certain circumstances only, and more especially in fresh waters, when spawning ground was deficient. The Americans as early as 1871 went in for hatching. He instanced what they had done in shad hatching as an example of its success. They carried the shad across to the Pacific waters. In the case of salmon and trout, river hatching had been an enormous success. Where they had too little spawning ground and plenty feeding ground hatching was an advantage.

Naturalists were also studying the young of fish. There was the question of the destruction of young fish by trawlers and others, and associated with that question was the study of what he might call fish nurseries. The latter were places where

young fish were crowded together, and where there were comparatively few old fish. Trawlers were more successful in catching the young fish than the old fish. All he had to say was, if they emptied the nursery he took it for granted that the drawing-room would not be full in a little time. In Lancashire this matter was being considered, and they were regulating the size of the mesh of fishing nets.

Naturalists had also been considering the food of fish and their feeding habits. A popular belief was that the larger fish fed on the smaller, and so on, but ultimately they found their fishes were dependent on plant life It was the plants that made organic stuff.

Dealing with the question of artificial baits, the lecturer said some fish distinguished their food by smell almost, others by sight almost entirely.

The lecturer then referred to the enemies of our food fishes, and pointed out that naturalists were principally engaged on how to get rid of them by encouraging the enemies of the enemies of our food fish. The question arose could men overfish the seas? Professor Huxley had been of opinion that this was impossible, and that the damage done by man was infinitesimal compared with what was done by other enemies. It was the last straw that broke the camel's back, and if they put on that last straw it made all the difference, and he thought man could play the part of the last straw. There was a great deal of injury which might be prevented, and it was with that he wished to interfere.

In conclusion reference was made to the importance of properly equipped marine stations for the study of all questions relating to the fisheries, and a hope was expressed that before long such a station might be instituted near Belfast.

Professor Symington moved a vote of thanks to Professor Gregg Wilson for his lecture. He thought it was appropriate that they should consider on that occasion what could be done in connection with their own fisheries. With the exception of what was being done by Mr. Holt, under the Agricultural Depart-

ment, on the Western-Southern Coasts there were absolutely no scientific investigations being conducted in any part of Ireland with regard to that question. In connection with that Society something might be done on the North-East Coast. There was no difficulty in getting a suitable site for starting a modest modern laboratory. Professor Wilson spoke to them that evening as an expert, and he was sure he would be only too anxious and willing to assist any of them that wished to take up that department of the work.

Rev. D. A. Purves, in seconding the motion, as an outsider, was sure that in Professor Gregg Wilson not only Queen's College, but the city of Belfast, had received a great acquisition. While he had given them a scientific lecture, they would all agree that he had been perfectly lucid. He concurred with the suggestion that had been thrown out that the services of a man like Professor Gregg Wilson should be in some way secured to that neighbourhood, and he did trust that the outcome of that meeting would be that steps would be taken to instal a modern laboratory in the region of Belfast.

The motion was carried and suitably conveyed by the Chairman, who referred to the time when many of the most eminent naturalists of Great Britain belonged to the North of Ireland.

A similar compliment was paid to Professor Redfern, on the motion of Mr. J. J. Andrews, seconded by Mr. William Shaw.

17th December, 1902.

Mr. Robert Young, J.P., in the Chair.

EVIDENCE OF THE CAVES.

By R. J. Ussher, J.P.

(*Abstract.*)

Kent's Cavern, in Devonshire, is very extensive, and contains many chambers and passages. On the top of its deposits were blocks and masses of limestone that had fallen from the roof, and the uppermost deposit, a black mould, lay between these. It was largely formed of leaves blown into the cave, and contained miscellaneous relics, from the soda-water bottle of the modern tourist to relics of mediæval, Roman, and pre-Roman times—bronze articles. spindle-whorls, broken pottery, including Samian ware; ancient bone implements, amber beads, and charred wood; also human bones, bones of brown bear, red deer, and of domestic animals, such as dog, pig, ox, and sheep. Beneath the black mould no remains of sheep occurred. None of these relics carry us back beyond historic times.

The second deposit was a floor of granular stalagmite varying from a mere film to five feet in thickness.

The third deposit was confined to one part of the cavern, and was called the black band. It was composed of little bits of charred wood, the hearthplace of the palæolithic cave men. Three hundred and sixty flint weapons or tools were found here,

with bones that had been roasted, and bone tools, an awl, a harpoon, a fish-spear, and a needle of bone. With these were bones of hyæna, rhinoceros, horse, ox, and deer. Here was the home of those ancient hunters who lived in England with the hyæna, the mammoth, and the rhinoceros, and who used flint weapons, which they manufactured round this fireplace.

The next deposit, which extended throughout the cave, was a reddish cave earth, and it yielded the greatest store of animal remains. They represented hyæna, horse, woolly rhinoceros, mammoth or woolly elephant, Irish elk, reindeer, red deer, lion, and other animals, some of which exist at the present day, while others are long since extinct. Among the relics of the latter were some teeth of the machairodus, or sabre-toothed lion, whose upper canine teeth were of enormous size and serrated. It was a very ancient and pliocene animal. Hyænas appear from their numerous bones to have been very abundant, and some of the others, as the reindeer, were suited for life in Arctic countries. But, besides the beasts of prey, human inhabitants—doubtless a race of hunters—lived there at times. They probably lighted large fires near the cave's mouth, where the black band occurred, to keep out the wild beasts during their stay. The objects these hunters left behind them were chiefly spear heads of flint, carefully chipped into shape with great labour, as is still done by some savage nations. Carved bone harpoons were also found in the cave earth, and a bone pin, which was in contact with the tooth of a rhinoceros.

But there was an older chapter still in the history of Kent's cave. Another stalagmite floor lay beneath the cave earth, crystalline in structure, which showed its greater age, and it attained in places twelve feet in thickness.

The lowest deposit, which lay under the crystalline stalagmite, was a dark-red sandy paste in places, but was often found in masses of rocklike hardness, and was called the Breccia. It was largely composed, not of limestone fragments, but of pieces of red grit, a rock which is not to be found in the cavern-hill, but in hills now separated from it by a valley seventy feet deep

below the cave level. Therefore this red grit must have here drifted into the cave before this deep valley had been gradually scooped out by rains and streams. The Breccia contained numbers of bones, but they were all of the great cave bear, except two jaws of lion and another of fox, and none of these bones had been gnawed by hyænas, like those in the cave earth above. Even here, however, human implements of flint were found, not so finely wrought as those in the cave earth above, but unmistakably the work of men. No one can assign a date to these things, but, ancient as must have been the men of the cave earth who lived when mammoths and their companions existed, the people who made the weapons found in the Breccia were vastly older. We can only say that they represented a very far-off age, as when one sees the snowy peaks of lofty mountains rising against a clear sky he is sure they are further than any other visible object, but cannot say how great their distance is.

In 1858 quarrymen working on the site of an ancient cave at Shandon, near Dungarvan, in County Waterford, found the remains of a mammoth with those of reindeer. They were brought to light by the late Mr. E. Brenan, of Dungarvan, and are now in the Science and Art Museum, Dublin. Bones of horse, bear, and other animals were also found in Shandon Cave by Professor Leith Adams, who had done cave exploration work in Malta.

In company with him in 1879 I opened up a small cave half-a-mile south of the Cappagh Station, in the townland of Ballynamintra. It was nearly filled with deposits ; but, now that it is cleared, it forms a tunnel about eight feet wide. When we began to dig we found in the brown earth which lay uppermost many bones of domestic animals—as cows, sheep, pigs and dogs—with some human bones ; but as we dug deeper we came to a grey earth that contained more ancient-looking blackened bones of a larger size. These were fragmentary, but when we came upon pieces of palmated antlers my friend pronounced them without doubt to belong to the Irish elk. Its remains,

though frequently found in bogs, had never been discovered before in a cave in Ireland, nor associated here with evidences of man; but no sooner did Dr. Leith Adams find the bones of this gigantic deer in the same bed with charcoal and other relics of man than he freely confessed we had found proof that the Irish elk had existed in the human period in this country. In England Irish elk had been found with man in Kent's cavern. The gigantic size of the stately and beautiful animal may be judged by the skeletons and antlers in our museums. Though found in other countries it has nowhere been found so abundantly as in Ireland, where it had probably had fewer enemies, as there were not so many species of beasts of prey, and it certainly multiplied and flourished largely throughout this island, where its remains are often found in, or rather under, bogs, most commonly in the shell-marl. At Cappagh my father found the bones and antlers of at least sixteen, and in Ballybetagh Bog, County Dublin, no fewer than one hundred and thirty individuals were discovered. It is chiefly the males that are thus found, probably owing to the enormous weight of their antlers having made them more likely to be drowned or bogged.

But to return to the Ballynamintra cave, we found in the earth of the second stratum or in crevices of the rocky walls many bones of the Irish elk. They were split and broken, the ends of the narrow bones being invariably knocked off, as used to be done by all ancient peoples to the bones of an ox and other beasts. Moreover, the pieces of Irish elks' antlers could hardly have been brought into that small cave except by man, the animal being too large to enter it alive. These facts of themselves show that we had found the retreat of an early people who had hunted the Irish elk, of which at least five individuals were represented by their remains. In the same stratum that contained them were quantities of burned wood, and this charcoal, which formed a seam in the midst of the grey earth, marked an ancient floor or hearth, and proved that the bed had not been disturbed. There were also sea shells in

it, brought by the human inhabitants, and a number of stones suitable for taking in the hand and striking with, which were chipped along their edges in a way that leaves no doubt they had been used to break the bones with. Beneath the grey earth were remains of a great stalagmite floor, four feet thick in places, which had crystallised. In the lower part of this, which lay upon a bed of gravel, were found embedded the teeth and bones of a huge bear, pronounced by Professor Busk to have been the grisly bear, now confined to the Rocky Mountains of North America. The deposits of this cave also contained some teeth and bones of reindeer. Thus the Ballynamintra Cave yielded relics of three distinct ages—the neolithic, with its polished stone axe and domestic animals; then the age of the elk-hunters; and before that the time of the grisly bear.

Within the last two years good work has been done in other Irish caves by a Committee appointed by the British Association, under Dr. Scharff, who has organised the movement, and assigned to me the execution of the excavations. In 1901 we worked in caves in Keish Corran Mountain, County Sligo, in which were found two distinct strata—the uppermost of grey earth, containing a stone celt, bronze pins and objects of iron, abundance of charcoal, bones of domestic animals, and some oyster and mussell shells. Bones of bear were also found, and a shin bone of reindeer, beneath which charcoal occurred, in the same stratum. This was fair evidence that the reindeer had been contemporaneous with man in Ireland. The second stratum was a clay in which the characteristic animal was the brown bear; but in these caves the jaws and bones of the Arctic lemming were found in abundance. This was the first discovery of it in Ireland, and the species differs from the lemming of Norway, and is not found nearer than Greenland at the present day.

During the summer of 1902 two groups of caves have been excavated at Edenvale, in County Clare. In these the upper stratum has, as usual, yielded in profusion charcoal, bones of domestic animals, many human bones, and other relics of

ancient art, knives of iron, objects of bronze, bracelets of metal, an amber bead, pins or awls of bone ; but besides these, chiefly in the second stratum, we found great numbers of bones and teeth of reindeer and bear, and some of the latter of enormous size, whose species remains to be determined. Some relics of the Irish elk also have occurred in the Edenvale caves, which are very complicated and extensive, and are by no means dug out.

In the chalky limestone of the Antrim cliffs numerous caves occur, and during the formation of the new walk at the Gobbins last summer by the Belfast and Northern Counties Railway Company a large cavern was found, closed by a slipped piece of the cliff, and full of the shingle of an old raised beach. In this Mr. Welch has found many bones of domestic and wild animals, and some portions of red deer's antler of large size, which are exhibited. It is hoped that further researches of various parts of Ireland will lead to a much fuller knowledge of its prehistoric past.

Mr. John M. Dickson moved a vote of thanks to the lecturer.

Professor J. Symington, in seconding the motion, said, though Mr. Ussher was a well-known ornithologist, in recent years he had become possibly better known as a cave explorer. He believed interesting investigations could be made on the Northern coast as regarded cave exploration.

Mr. William Gray, from personal research, believed that interesting results would reward the proper investigation of the caves along the North coast of Antrim, from White Park Bay to Carrick-a-Rede. A cave near Pulbraddan was well worth exploring.

Mr. R. Knowles thought the question was deserving of the consideration of the Field Club.

The motion was passed.

7th January, 1903.

Mr. J. Brown, F.R.S., President, in the Chair.

HEREDITY IN ITS RELATION TO THE NERVOUS SYSTEM.

By John M. MacCormac, M.D., L.R.C.P. & S.Edin.

(*Abstract.*)

In assuming that the mind of a child is devoid of character or ideas, Locke attributed nothing to heredity. Man enters this world as a stranger, it is true, but he can investigate and explore, and his mind is ever active to receive various perceptions, and it is a matter of common observation that the same objects produce different effects upon different minds. A poet, painter or geologist looks at a landscape with entirely different ideas. While the country lad knows every bird song and the intricacies of every glade, the town-bred boy revels in bricks and mortar and despises the dirty lanes. In all there is a special quality, which responds to external perceptions, and which is due to heredity.

The broadest principle of heredity is, that like produces like, that all the physiological and psychological characteristics of the parent are transmitted to the child. Hence Darwin's theory of Pangenesis, which supposes that every cell gives off gemmules or germs, which permeating the whole body, and

becoming collected in the generative cells, can reproduce the whole organism. This theory was too complex to commend itself to physiologists.

Sanson defines heredity as the transmission of natural or acquired qualities from predecessor to descendants. Professor Weisman founds a theory of heredity, which assumes that acquired characters cannot be transmitted, while many consider that they can be inherited. It is clear that acquired characters, such as mutilations, e.g., the clipping of dogs' ears and tails, the piercing of women's ears, the deformity of the feet of Chinese women, affect the individual only. Dr. Archdall Reid remarks that there are two classes of characters, inborn and acquired, and the question of the transmission of the latter has been warmly debated. This difference of opinion arises from the difficulty of deciding what is due to heredity, and what to environment. It is commonly said that all theories of heredity are in essence theories of evolution, but theories of evolution depend directly upon environment, while theories of heredity are closely associated with the nervous system. Professor Titchener maintains that every child is born with certain tendencies, which differ according as the child takes after this or that predecessor. The nervous system of each is the product of a long course of development, and all sorts of influences have combined to affect it. Hence the different mental characteristics.

But are physiological and psychological heredity mutually dependent or not? Science cannot settle this, unless we are prepared for materialism, and to deny the existence of the soul. This must be considered. The ancients believed that souls migrated from men to animals and *vice versâ*, and this belief, finding its way into the early church, gave rise to different theories of the soul's existence. Later arose the question whether the soul was not generated at the same time as the body, and the theory "Traducianism," arising out of this, was adopted by many of the early Fathers. Lactantius asked from which parent the soul sprang, and exploded the theory.

A later theory "Creationism" suggested that the Creator is perpetually creating souls, and infusing them into bodies. This subjects the work of the Almighty to the will of human beings. A third theory teaches that the Creator, at the beginning, imparted to man a spiritual element, which should, in due course, develop into a force, controlling the body, and becoming fitted for a continuous existence. Thus may be understood the possibility of a permanent physiological state, producing or developing a permanent psychological state corresponding with it. To admit psychological heredity therefore follows the admission of the principle of physiological heredity, and establishes the direct influence of the nervous system upon mental processes. We therefore hold with Spencer that Consciousness is a continuous adjustment of internal with external relations, that every psychical phenomenon is inherent in some organ, and that mental and physical tendencies are alike transmitted.

Evolution, to which reference must be made, depends upon external influences or environment, and influences both the physical and mental characteristics. This influence can be so directed as to considerably affect earlier hereditary traits, and produce variation *within* the species. Illustrations of this fact are well known. The modified theory of evolution of Monsieur Naudin is that its object is to produce a definitive species, since in the earliest period living creatures had a more plastic and variable habit than now, and that this plastic character is an evidence of design. It is however for Science yet to confirm this, as well as the Darwinian theory of the variability of species. No evidence can be found of the transformation of species, while the weak as well as the strong find room for existence. Moreover palæontology establishes the identity of seeds, plants and species with those of ages far remote, while another strong objection to the transformation theory is the uniform sterility of hybrids. It must also be observed that as soon as the operation of environment ceases, there is a gradual return to the primitive type. As Professor Drummond pointed out, choice

roses, strawberries, raspberries, and fruit trees, if left untended, without culture, return to the briar, the wild fruit of the woods, the bramble, and the useless undergrowth. Similarly fancy pigeons soon revert to the plain, uniform colour of the original type. The same is observable in human beings, who neglect themselves, and are removed from beneficial and improving influences. These considerations show how closely interwoven are the laws of heredity and evolution, and afford striking evidence of design. One of the greatest of naturalists, Professor Agassiz maintains this, when he says :—"Nothing in the organic kingdom is calculated to impress us so strongly as the unity of plan, which is apparent in the structure of the most various types." And after pointing out the wonderful relations and admirable harmony, he says :—"If all these relations are beyond man's intellectual power to grasp, if man himself is but a part or fragment of the whole system, how could this system have been called into being if there were not a supreme intelligence the author of all things?" Monsieur Ribot raises the ascertained fact of the physiological and psychological transmission of general specific characters to the dignity of a law, with the necessary reservation, that heredity is twofold and that the operation of the law must be in favourable circumstances, otherwise the blind fatality of its laws might make decadence the rule. But as universal life develops in the direction of progress, heredity is not abandoned to a blind fatality. There must be a presiding directing power. So Darwin has taught us that the laws of evolution point to a supreme intelligence. His theory, however, like those of Haeckel and Spencer, is intensely materialistic. While enforcing his law of the persistence of force, Spencer had to admit the possible existence of an intelligent causation; but Haeckel recognised only the materialistic principle, starting with the theory of spontaneous generation. Professor Tyndall and Dr. Dallinger have however disproved this theory by showing that life can only come from the touch of life. Dr. Archdall Reid asks us to consider the vast complexity, physical

and mental, of man, to think of our futile microscopes and our infantile chemical analyses, and so to gather some idea of the vanity of attempting to pry into the how of the inheritance of either inborn or acquired traits. The law exists, and from a physiological standpoint argues in favour of determinism. But psychology must also be considered, and hence the influence of the nervous system. If the mind is merely a physical outcome of the brain, then psychological and physiological phenomena cannot be distinguished, but the theory of the soul's existence is an important factor here. Luys and Maudsley both hold that the physical operations of the brain constitute intellectual and moral life, and that by means of these, it feels, remembers, and re-acts. This materialistic doctrine, which asserts the identity of brain and thought, sets aside all idea of free will. It maintains that "The organism is the man himself," that "intelligence is the result of organic phenomena," that "thought is only a function of the nervous centres." But is this so? Internal phenomena can only be perceived by one faculty—consciousness, and Maudsley himself admits that they are incapable of experimental demonstration. The moral and physical are not identical, for the mind, conscious of motion, is also conscious of itself. It is an "ego" and cannot be produced by a material organ. The brain is the organ of thought, as the eye is the organ of vision, and as perfect vision depends upon a perfect eye, so perfect thought depends upon a perfect brain. Now the nervous system has certain leanings in a definite direction, and what that direction is, is determined by influence, which even affected remote ancestors. But it is in youth easily moulded. Hence the great problem of Education for habit becomes second nature.

Psychologically "apperception" is defined as a psychical activity by which individual perceptions are brought into relation to our previous intellectual and emotional life, assimilated with it, and raised to greater clearness and significance. It thus indicates the intimate relationship between Heredity and the Nervous System, and may be considered the

connecting link between physiological and psychological developments. This common ground presupposes a mental bias, but what that bias is we cannot predict, we can only learn by experience. That this bias can be altered or modified by attention, an act of volition, to other influences, is a matter of daily observation and experience. We cannot therefore but conclude that the nervous system is seriously affected by environment, habit and volition, and that there is an influence directly transmitted from one generation to another. How far this influence may be directed or counteracted by the will is a question to be determined. If to-day we are the subjects of it, this arises from the freedom of yesterday. Our good or ill may be referred to the free acts of our predecessors, so we, by the force of our own will, are the parents of our own acts, and may influence the acts of others. Our consciousness convinces us that, while we have acted in a certain way, it was in our own power to have acted otherwise. The great past is the outcome of human freedom, and it is to that freedom we must look for the improvement or depreciation of the influences affecting future genetations.

Professor Gregg Wilson, in proposing a vote of thanks to Dr. MacCormac for his lecture, said he was not going to say very much, because after considering such grave matters as those treated in the lecture one was more in a condition to think than to talk. He believed Dr. MacCormac would have the effect of stimulating a great deal of thought and controversy amongst his audience.

Mr. Robert Patterson seconded the vote of thanks, which was uuanimously passed.

Dr. MacCormac briefly replied in acknowlegement of the vote.

3rd February, 1903.

Mr. Robert Young, J.P., in the Chair.

THE MICRO-FAUNA OF THE BOULDER CLAY, WITH SOME REMARKS ON THE MOVEMENT OF GLACIERS,

By Joseph Wright, F.G.S.

(Abstract.)

Boulder Clay is a stiff compact clay, containing numerous boulders as well as smaller stones, the greater portion of which are more or less rounded, their surfaces being often striated and scored. It formed the subsoil of the greater part of this country—it occurred at all elevations, from the sea level to a height of upwards of 1,500 feet above the sea. Foraminifera have been found at many places in the clay. I have examined samples of it from 134 localities—from Ireland, England, Wales, Scotland, Isle of Man, Canada, and Novaia Zemlia, and in 105 of these Foraminifera had been found. In some places they were very rare, in others they were abundant, but their presence was demonstrated in three-fourths of the instances. With one or two exceptions all the species found in the clay occurred recently off our coast, the fossil specimens having usually the fresh lustrous appearance of specimens brought up by the dredge. Ten of the samples were obtained from altitudes of 500 to 1350 feet, all of which, with one exception, contained Foraminifera.

With the exception of sixteen samples received from Novaia Zemlia which, on account of the smallness of their size, had to be examined in detail under the microscope, floatings from the clays were alone examined. To ascertain how far the process of floating could be relied on for giving conclusive results, one ounce troy of the boulder clay from Woodburn, Carrickfergus, was examined with great care. The first floating contained 1,400 specimens, this process having to be repeated twenty-four times before specimens ceased to come up. What remained of the clay was then examined under the microscope, and sixty-seven additional specimens were got from it. Upwards of 2,100 specimens were obtained from this ounce of clay. This experiment clearly demonstrated that the process of floating cannot be relied on for proving the non-existence of Foraminifera in Boulder Clay.

The micro-fauna of the Boulder clay is a peculiar one, more than half of the entire specimens found being referable to *Nonionina depressula*, whilst *Cassidulina crassa*, though somewhat rare as a recent British species, is often plentiful. The Porcellanous forms are usually very rare, whilst the *Arenacea* are represented only by the species *Haplophragmium canariense*.

The marine fauna in a climate so rigorous as must have prevailed during the glacial period could not fail but be a poor one. Mr. S. A. Stewart, in his "Mollusca of the Boulder Clay of the North East of Ireland," says :—" Molluscan shells occuring in the Boulder clay are not numerous. In most cases they are only got by patient searching, and then only in a fragmentary condition ; but in a few instances they are less rare, and include specimens in a perfect state. The presence of perfect shells of *Leda* was known long since to General Portlock, and forced him to the same conclusion as arrived at by the author, that the Boulder clay is a marine sedimentary deposit."*

No doubt many of the shells in boulder clay were transported

*Proc. Belfast Nat. Field Club. App. 1879-80.

by icebergs with stones and rock fragments, but some of them certainly lived at the places where they are now found, and with some few exceptions, all the Foraminifera must have done so, as these microzoa are usually as perfect and as fresh looking as recent specimens brought up by the dredge. There were in glacial times both elevation and subsidence. First glacial striation, then depression, boulder clay, and marine organisms.

At Woodburn and Knock Glen, *Leda pygmæa* and *L. minuta* are frequently found with their valves united, here also Foraminifera occur in the very greatest profusion, 100 species having been found at Woodburn and 79 at Knock Glen. Foraminifera in boulder clay are usually much smaller in size than recent British species, but many of the specimens at these two localities are fairly large in size, the following are the most notable in this respect:—*Miliolina seminulum*, *Nonionina orbicularis* and *Polystomella arctica*. Three of the species found at Woodburn and five of those from Knock Glen are only known as recent British species from gatherings taken off the West Coast of Ireland, two of them also occurring off the West Coast of Scotland. Some of these West of Ireland species have also been found in boulder clay at other places. *Lagena fimbriata* was got at five other localities, one of them being Larch Hill, Co. Dublin, 650 feet above the sea, and *Polystomella subnodosa* was got at Deppel Burn, Ayrshire, at 1061 feet elevation. The presence of these West of Ireland Foraminifera in the boulder clay of Woodburn, Knock Glen, and some other places, would lead us to infer that when these clays were deposited the land stood at a much lower level than now, and when the marine conditions were somewhat similar to what now prevails off the West Coast of Ireland. The fineness of the clay at these two localities, and their freedom from stones, the perfect condition of some of the *Leda* shells, the profusion of Foraminifera, and the large size of some of the specimens, would support the view that the clay at these two localities was deposited in deep and quiet water, and below the disturbing influence of ice action. Boulder clay with many stones in

it usually contains few Foraminifera, and would be characteristic of deposits formed near exposed sea coasts, as such situations are not favourable for marine forms of life.

Reference may be made to the slow downward movement of glaciers by gravity, and that when they terminated in the sea, as they frequently did in the Arctic regions, they sooner or later broke off into large masses, floating away as icebergs, carrying with them any stones or other material which they had accumulated in their course. As ice when submerged beneath the sea diminishes far more rapidly than when in air, so the bergs quickly melted away. depositing their burden over the floor of the ocean ; and to this cause, as also to the action of shore ice, may be largely attributed the formation of boulder clay.

Should at any future time the sea bed between Labrador and Greenland be raised above the sea, one can readily imagine such a place to present a very similar appearance to that which we now find in boulder clay. There would be rock fragments and stones striated and scored by ice action, with shells more or less broken, and other material which had been dropped there by bergs floating southward from Arctic places. With these would be found associated mud and stones from the wearing of rocks in the vicinity, and also marine organisms that lived at the place.

PLATE I.

JUNCTION OF GRANITE AND SILURIAN ROCK, GLEN RIVER, NEWCASTLE, CO. DOWN.

To the left a lamprophyre dyke, cut off by the granite. G—Granite; S—Silurian shale; D—Dyke of Dioritic lamprophyre. (From a photograph by Miss M. K. Andrews: *copyright*).

NOTES ON SOME IGNEOUS ROCKS IN DOWN AND ANTRIM.*

By Miss Mary K. Andrews.

(*Abstract.*)

The following brief notes refer to rocks exposed in the bed of the Glen River at Newcastle, Co. Down, to certain dykes on the Mourne Coast, north of Glasdrumman Port, to a few of the rhyolites of Co. Antrim, and to one or two points of interest connected with its Basaltic Plateau.

Beginning with the granite of the Mourne Mountains, attention may be drawn to its well known resemblance in miarolitic structure and other characteristics to some of the granite of Arran, and to the probability that both are of Tertiary age. Direct evidence is still wanting, but one of the many points that support this inference, is that in its intrusion into the surrounding grits and shales, the Mourne granite has cut off a number of basic dykes, possibly belonging to the Tertiary "Lower Basalts," and is itself penetrated by a less numerous later series, probably representative of the "Upper Basalts." In the first lantern slide (reproduced in Plate I.), one of these older dykes is seen cut off by the granite. This very interesting section occurs at an approximate height of 550 feet above sea level, and about 300 yards from the second stone bridge in Donard Lodge Park. The photograph shows the junction of the granite and Silurian rock in the bed of the Glen River. The head of the hammer is on the line of

* The paper was mostly illustrated by lantern slides from the author's geological photographs, and by microscopic sections of specimens she had collected.

junction, where the two rocks are united into so hard a mass, it was difficult to obtain specimens. Towards the middle of the river granite veins penetrate the sedimentary rock, whose normal colour becomes lighter in its vicinity. Microscopic sections of the granite obtained at and above this junction show beautiful examples of the micrographic intergrowth of quartz and felspar characteristic of granophyres. At the left side of the photograph, close to the right bank of the river, a dyke of dioritic lamprophyre is seen traversing the Silurian rock in a N.N.W. direction, and is cut off by the granite. The shale in contact is greatly indurated, and so similar in colour to the dyke, that it was not easy to trace the exact line of demarcation. In microscopic section, the intermingling of the green hornblende bands, probably of igneous origin, with the brown clastic patches of the sedimentary rock is very striking.* (Plate 2.) When the river is exceptionally low a continuation of one of the granophyric veins already referred to, can be seen crossing the dyke.

Donard Tunnel passes close to this junction, and there are large specimens from it on the table—baked sedimentary rock, penetrated by eurite bands. In the course of its construction, I had in September, 1897, an opportunity of seeing dykes of the later series. A very interesting section was then temporarily exposed in the "cut and cover" to this tunnel, about a quarter of a mile south of the Bloody Bridge River. The normal granite of the district was here seen to about six feet in depth, capped by four feet of drift deposit. Two basalt dykes traversed the granite at an interval of forty yards from each

* This microscopic section, with one of the dyke itself, was submitted to Professor Cole, to whom I am indebted for the following interesting remarks. "Your 'dioritic lamprophyre' is a curious rock, with its sparse triclinic felspars, and its groundwork of biotite and green hornblende. It looks as if a magma capable of making biotite and pyroxene had remained as a groundwork after the felspar had developed, and then this magma crystallised out, the pyroxenic matter finally passing into granular amphibole. But the Silurian contact-rock shows similar patches of granular hornblende, and an abundanee of the same brown mica. Is this rock permeated by the igneous one in intimate streaks, or does the igneous one owe some of its matter to absorption of the adjacent sediment? The former view looks to me more probable."

Photo and Process Block by Bemrose & Sons, Limited, Derby.

PLATE II.

MICROSCOPIC SECTION showing junction of Dioritic lamprophyre dyke, with indurated Silurian shale. The lamprophyre is at the top. Intermingling of igneous and sedimentary rock below. The hornblendic bands are the darkest. The lighter parts are sedimentary, traversed by short dark bands composed of biotite ($\times 4\frac{2}{3}$.)

other, and thirty yards further south, it was also traversed by a conspicuous greenish granite band about five feet wide. A microscopic section of the more southern basic dyke shows it to be a true basalt. Newer than the granite which it penetrates, it probably represents the Tertiary "Upper Basalts." The greenish granite is a handsome rock, with fairly large crystals of quartz and felspar, coarser in texture than the normal granite, but the difference microscopically is not very great.

The next slides show dykes on the sea coast, and in connection with these, I may refer to Major Patrickson's paper read before the Geological Society of Dublin in 1835, entitled, "A descriptive list of the dykes appearing on the shore which skirts the Mourne Mountains." His list includes 76 dykes. One of these, No. 48, he mentions as a porphyritic dyke, a quarter of a mile North of Mullartown, and describes Nos. 47 and 49 as hornblende dykes in parallel contact with it. These have been identified by Professor Cole with the now well known composite dyke at Glasdrumman Port, minutely described by him in a paper "On derived crystals in the Basaltic Andesite of Glasdrumman Port," * in which he shows that "crystals may be floated away into a pre-existing rock of a low degree of fusibility from one of a higher degree which has intruded into it." The igneous contact described by Professor Cole is illustrated by the next two lantern slides, from Mr. Welch's series of "Irish Geological Views." Hand specimens from this interesting dyke are on the table.

Passing on to Dunmore Head it may be of interest to note that this is one of the few localities in the British Islands where variolite has been found, and with specimens of the Dunmore variolite, there are others from Annalong, Anglesey, and Australia, the latter particularly interesting as being the first variolite discovered there. It was found in the bed of the Saltwater River, near Sydenham, upon an excursion, conducted

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* Trans. Roy. Dublin Soc. Vol. V., Ser. II., Aug. 1894.

in April, 1902, by Dr. Gregory. For this specimen I am indebted to Mr. Chapman, Palæontologist of the National Museum, Melbourne.

The next slide shows the position of a large porphyrite (altered andesite) dyke, about a quarter of a mile south of Green Harbour, apparently No. 23 of Major Patrickson's list. In the main central part of the dyke there are very numerous and large crystals of labradorite, and in microscopic section, the schillerization of the labradorite, and the "strain shadows" have a very beautiful effect.

In the little creek, called "Goat's Cove," shown in the next slide, there is a small composite dyke I have not seen noted elsewhere. The quartz-porphyry in the centre has an average width of three feet, and is bounded on both sides by a basic dyke into which the acid rock has probably intruded. A few dark inclusions are found in the quartz-porphyry, which in microscopic section appear to be altered shale. The position of this creek is a little south of Bloody Bridge, almost immediately below the interesting old ruin of Ballaghanery church, popularly known as St. Mary's. Another composite dyke occurs at Dullisk Cove, just north of this creek.

The next two views show parts of a very interesting dyke on the sea coast, a little north of Bloody Bridge, in front of a low hill known as Rock-a-bill. It traverses Silurian strata in a north and south direction, and at the northern end, considerable patches of the Silurian beds are seen at the surface. The rock appeared at first sight to be a typical quartz-felsite, but microscopic examination of the first slide made, revealed certain characteristics of rhyolites, which indicate the intermediate position it holds between these well marked types. Dr. Cullis, to whom it was shown, described it as a "stony rhyolite approaching quartz-felsite." * Other microscopic sections show the base in various stages of devitrification. This dyke cuts

* Mr. H. J. Seymour asked for the loan of this microscopic section to exhibit before the Dublin Microscopical Club, and the details he then gave are published in "The Irish Naturalist," Sept., 1897, p. 248

through one of basalt, which may be seen in the bottom of a deep gully. Between this and Newcastle there are several basic dykes, one large one occurring just below the houses known as the "Widow's Row."

As the granite of the Mourne Mountains is now regarded as probably contemporaneous with the rhyolites of Co. Antrim, I have selected for the first two views in that county slides showing the rhyolite at the east and west ends of the quarry at Templepatrick Railway Station. It was here that Mr. M'Henry obtained the interesting evidence which led him to the conclusion that the rhyolite had intruded in the form of a laccolite into the Lower Basalt series, now regarded as of Eocene age, while further evidence obtained at Ballypalady and Glenarm, showed it to be older than the Upper Basalt sheets, or, so to speak, of mid-basaltic age.* It is interesting to note that, in this respect, these later observations bear out the view of Sir Richard Griffith, who in his address to the Geological Society of Dublin in 1836, placed the relative age of the "Sandy Brae Porphyry" between that of the "Lower" and "Upper tabular trap."

The chief localities in Co. Antrim for rhyolites, besides Templepatrick, are Tardree, Sandy Braes, and Ballymena. Specimens from these districts are on the table, for several of which I am indebted to Mr. Robert Bell, whose fine collections of fossils and rock specimens are well known.

The next lantern slide shows an exposure of beautifully banded rhyolite in a quarry between Tardree and Sandy Braes, and it will be followed by two slides showing a small protrusion of rhyolite at Cloughwater. "The whole mass," Professor Cole writes, "is so small, that it might possibly be a displaced portion of a lava-stream, as it stands we must regard it as representing a volcanic neck." †

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* "On the Age of the Trachytic Rocks of Antrim," by A. M'Henry, M.R.I.A. Geol. Mag., Dec. 4, Vol. 2, p. 260.

† The Rhyolites of the Co. of Antrim. By Grenville A. J. Cole, M.R.I.A., F.G.S. Sc. Trans. Roy. Dublin Soc., vol. VI., Ser. II., p. 112.

The second view of this rhyolite boss includes the moorland behind, and Slemish, the finest example in our district of a volcanic neck, in the extreme distance.

In connection with the dolerite of which Slemish is composed, I may mention that it was in this rock that my father, Dr. Andrews, by a magneto-chemical process, discovered native iron widely diffused in microscopic particles. The observation was unexpected, as except in meteorites, native iron is of very rare occurrence. Dr. Andrews detected it also in various basalts, in the indurated lias of Portrush, and in a trachyte from Auvergne, but the largest indications were obtained from the olivine dolerite of Slemish.

The next lantern slides show views of Kenbaan, one of the most striking headlands of our coast. The intrusion of basalt below the chalk anticline is of special interest in connection with the well known controversy between "Neptunists" and "Vulcanists" in regard to the origin of basalt and other igneous rocks.

My last slide is of Scrabo Hill, which although in Co. Down, is regarded as an outlier of the Antrim Basaltic Plateau. It affords very fine examples of sills and dykes, exposed in its large quarries of Triassic sandstone. The sandstone has been protected on the top by a capping of dolerite, and the lantern slide shows a typical section with intrussive sills, cut through by a vertical dyke of later age.

The economic importance of the igneous rocks of Antrim and Down is well known, and in regard to this it is sufficient to note the employment of Castlewellan granite in the Albert Memorial, Hyde Park, and to refer to the important inquiries, instituted by Mr. Wilkinson, into the qualities of the various kinds of stones used for building purposes in Ireland. The results of his experiments are given in his work, entitled, "Practical Geology, and Ancient Architecture of Ireland," published in 1845.

In addition to the ordinary tests, I wish to draw attention to the great value of microscopic sections in determining the

qualities of building stones, and in this connection the following quotation from a letter just received from the eminent geologist Professor Judd, is of much interest. "Microscopic sections" Professor Judd writes, "are not infrequently employed to discriminate between the hardness and durability of different kinds of building materials, and of other rocks used for economic purposes.

There are two kinds of observations that can be made, 1st, as to the nature of the cement between the grains of a rock; 2nd, as to the amount of incipient decomposition the particles of a rock have undergone."

I have only now, in conclusion, to add—we are all justly proud of our coast scenery, do not let quarrying operations mar its beauty nor accelerate its erosion. On the other hand, geology may be largely aided by quarrying, and may we not hope that, especially in the inland rhyolite districts, further sections, as interesting as the classic section at Templepatrick, may yet be revealed.

Note on some Experiments on Irish Stone for Street Paving by H. Gullan.

Mr. H. Gullan, Superintendent of Works to the Corporation, referring to the use of Irish stone for street paving, informed the members present that the Works Department were about to lay down a series of lengths of sett paving in Corporation Street with stone from several Irish quarries, with a view of testing the quality of the various stone for the purpose of street paving. He also mentioned that a similar experiment

was being carried out in connection with road metal in Upper Townsend Street.

These experiments, he pointed out, would be of great value in determining the relative qualities of the stones, and he also trusted would result in the further development of Irish quarries.

Professor Redfern moved, and Mr. R. Patterson, seconded, a vote of thanks to the lecturers, which was heartily passed.

3rd March, 1903.

MR. J. BROWN, F.R.S., President in the Chair

THE ARMADA WRECKS ON THE IRISH COAST.

BY REV. W. S. GREEN, M.A.

(*Abstract.*)

REV. W. S. GREEN said that during the last dozen years a great deal of his life had been spent in the West Coast of Ireland. In the early part of that time he had to make a survey of the fishing grounds when Mr. Arthur Balfour was Chief Secretary for Ireland. It was natural that his interest should be awakened in the history of the past. There were a great many periods pressed on their attention when they were wandering round those places and had time to think, and there was no time more remarkable or striking when they tried to picture it than those days when the galleons of the great Spanish Armada were drifting ashore on all the bays of the West of Ireland.

At first it was difficult to get at any history on that point, but all the time he had been wandering in the West a good deal of publishing had been going on, publishing of the State papers not only British, but Spanish and Venetian, and all those documents had been made accessible by order of the Master of the Rolls. Anyone who took the trouble could find out in those pages the facts he would tell them, though a good deal of digging was required to get at the ore.

From days long before the dawn of history traffic appeared to have existed between the Iberian Peninsula and Ireland. It might have commenced when the Phœnician colonists were exploring the Western ocean. When history opened they found trade with Spain thoroughly established. Several

incidents in the histories of Galway and of Waterford formed good illustrations of this, as Spanish ships bearing wine and other commodities were constantly coming, and taking back hides, tallow, and fish. The fishing banks of the Irish coast were annually visited by Spaniards, who had permanent establishments in the harbours and creeks. In the early days of Queen Elizabeth as many as 600 Spanish fishing vessels were reported on the Irish coast in a single year, and Spaniards had permanent curing establishments.

Turning from peace to war, they read of a great sea fight in the Harbour of Kinsale in the year 1380, when Spanish and French galleys were attacked and destroyed by English and Irish. Later on, when Europe was convulsed by the wars resulting from the Reformation and the breaking up of the great empire of Charles V., Ireland came in for her share of disturbance, but in those times Spanish experiences in Ireland were almost a series of terrible disasters. The first act of invasion was followed by the massacre at Fort Del Ore in 1580, in Smerwick Harbour, in Kerry.

This, however, paled into insignificance when compared with the loss of the ships of the great Armada, which took place eight years after. In Connaught alone Sir Richard Bingham reported between 6,000 and 7,000 men drowned, and that he had executed 1,100 wretches who had escaped from the sea, many of them being notable grandees of Spain. Besides these losses thousands were drowned or slain in Ulster, while others perished on the coast of Kerry.

Though they had read long ago in their story books that the English fleet which went to attack the Armada was a small fleet, and that the vessels were small, yet when they came to look up the State papers they found that the vessels were fairly matched, and at least in the battle fought at Calais the English fleet outnumbered the Spanish considerably. There were about 100 Spanish vessels engaged against 140 ordinary English ships, with 9,000 English sailors. The Spaniards had 7,000 seamen. The largest guns in those days were the 42-pounders,

and the English had a great many more of those heavy guns in that fight. The Spaniards always wished to come into close quarters, but the English kept them at arm's length.

When the Spaniards were beaten they had to retreat round the North of Scotland and down the West of Ireland back to Spain, which the remainder of them reached starving, sick, and in a miserable plight.

The largest ship in the Armada was 1,300 tons, and carried about 40 guns. The largest English ship was about 1,100 tons, so that there was only about 100 tons difference in size. The poops of the Spanish vessels were very high ; the English cut their ships lower, and had an advantage in sailing. The English ships had been greatly improved in rigging. They were able to sail within five points of the wind ; the Spanish ships could only sail within six points of the wind. There was about one point of difference, and it made all the difference in the world. It enabled the English ships to keep the Spaniards to leeward. The reason why the English ships sailed closer to the wind was described in a book by Sir Walter Raleigh. The Spanish and English vessels carried big sails, and the English adopted bowlines, which were a great invention of that day, and enabled the English to sail round the Spaniards.

Some of the Spanish vessels, the lecturer pointed out, were propelled by three hundred rowers each, the idea being that they should be able to attack when they liked, and in the calm weather that no vessel could stand an attack from them. Unfortunately there was very little calm weather. The galleys, with hundreds of slaves chained to the oars, were always worsted.

The lecturer then gave an account of the battle and the retreat of the Spaniards up the North Sea and down the West Coast of Scotland and Ireland. Out of 131 vessels only 65 returned. Large numbers of the vessels perished on the Irish coasts. He gave a resumé of what had been learned of the adventures of the following vessels, illustrating his discourse by old maps, charts, and photographs, for the most part taken by

himself, on the Irish coast :—The Gerona, lost at the mouth of the River Bush, in Antrim ; the Valencera, in Glenagivney Bay ; the Duquesa Santa Ana, in Loughrosmore ; the Juliana and La Via, also in Donegal ; the San Juan de Sicilia, on the Sligo coast ; the Rata Encoronada, in Blacksod Bay ; El Gran Grin, on Clare Island ; the Falco Blanco Mediano, in Connemara ; and Nuestra Senora de la Rosa, in the Blasket Sound, County Kerry. The lecturer devoted special attention to the story of the Rata and to the adventures of Captain Cuellar, whose letter, recently translated from the Spanish, has proved so interesting to Irish readers.

So far as the literature of the subject was concerned, he referred specially to Mr. Froude, Professor Lawton, Major Hume, Mr. Allingham, and to the British, Spanish, and Venetian State papers. In relating Captain Cuellar's adventures after his miraculous escape from drowning in the wreck of the Spanish galleon on which he sailed, he told the story of his wanderings through the country. He made himself very agreeable to the people, and stopped for some time with a certain M'Clancy. One day when sitting in the sun M'Clancy's wife asked him to tell her fortune. He stated that he manufactured ten thousand falsehoods, which pleased her so much that all the country round were coming to him, and a special guard had to be appointed to protect him from these people. M'Clancy was so delighted with him that he insisted upon him marrying his sister, but that was too much for the Spanish grandee, and he asked to be shown the shortest way to Donegal. Eventually he managed to get to Scotland and round home.

The lecturer, having referred to some relics of the Armada, hoped in conclusion that he had been able to give them some points that would make the reading of that very interesting time in Irish history a little bit more interesting.

Professor Boas moved a vote of thanks to the lecturer. He said that the admirable address to which they had listened that evening was a most interesting exhibition of what he might

call the new historical method. The older school of historians had been content to base their narratives on the literary records of the past. But the newer school, while not neglecting these, drew upon two additional sources of information. Firstly they went to the State papers, and other first-hand documents. It was plain from his lecture that Mr. Green had made abundant use of these—not only of the English State papers bearing on the Elizabethan period, but of those belonging to foreign countries. Secondly, the new school of historians, headed in this respect by J. R. Green, called topography into their service, and were not content without surveying, as far as possible, the actual localities of the events which they described. The value of this method had been illustrated in the clearest possible way by the lecture that evening. Mr. Spotswood Green had gone carefully over all the localities associated with the wrecks of the Armada, and had used his camera to the best advantage. He had thus been able to fill in with vivid detail the narrative of events which they all knew in outline, and no one could come away from the lecture without a heightened historical sense, and a fuller grasp than before of the tragic story of the Armada.

Professor Fitzgerald seconded the motion, which was heartily carried, conveyed by the President, and suitably acknowledged by the reader of the paper.

Note on some Effects of the Cyclone of February, 27th, by R. Welch.

Photographs illustrating the effects of the cyclone of February 27th, at the Eastern intake at Limavady Junction were shown by Mr. R. Welch. The intake was flooded to the depth of eight feet in some places as the result of the embankment giving way, the railway line being submerged also three feet at each high tide.

7th April, 1903.

Mr. J. Brown, F.R.S., President in the Chair.

A LOST PRINCIPLE IN ART.

By George Coffey, M.A., M.R.I.A.

(*Abstract.*)

Mr. George Coffey said the actual subject of the lecture was really certain requirements, optical and artistic, which were practised by old artists, and which had actually perished out of art. Those discoveries, the great majority of them, were chiefly due to Mr Goodyear, curator of Brooklyn Fine Art Institution, who had made a tour in the North of Italy examining mediæval architecture, and he reported certain refinements. He had met Mr. Goodyear in England, and was in the position of being able to show them that evening a number of views of those buildings, many of which would be seen on this side of the Atlantic for the first time.

English architects had pooh-poohed those discoveries, but he was glad to say, because he believed in those theories, that on the Continent those views were rapidly extending, and in America they were being put into practical operation, so that he had no doubt that in a very short time they would have extended to this side of the water. They knew the ordinary Greek temple. Taking the Parthenon, it had been supposed that the columns were perpendicular, that lines which appeared horizontal were horizontal, and that it was laid out mathematically correct, and it had been assumed that the intervals between the columns were equal. Mr. Penrose, who died a

few years ago, discovered that it was filled with the most wonderful refinements. The columns, which appeared to be erect, leaned in slightly. The platform on which the temple was built, instead of being flat, was delicately curved. A delicate rhythm was given through the whole of the spacing of the columns. There were a number of other refinements. A sense of touch was given to the whole building, and every line of it was considered with a view to its effect.

The curves were first discovered by an Englishman named Pennythorn, and the general idea was that the curved line was to give a greater appearance of strength. Since Penrose's time it had been discovered that every Greek temple had its refinements, and Goodyear's discoveries went to show that not only did Egyptians and Greeks employ those refinements, but that they passed on to Roman and came down to mediæval times. The principle was called assymmetry, and he thought they would find that the principle of symmetry was death and the principle of assymmetry life.

Repetition was part of a tendency in the world towards uniformity, and there could be no manifestation of power except there was difference, and unless there was something vital and human in art there could be not relation between art and them. In those commercial days, when they turned out prints mechanically, commercial men had actually found it necessary to devise machines with eccentricities to try and imitate the life that was not in them.

In conclusion, he wanted to say let them not imagine this was an artistic age. They had for the present done with art. It died about 1600. But let them not imagine that by crowding their rooms by a whole lot of manufactured art that they were adding to the pleasure of life. Let them have plain and comfortable rooms, and let them purchase at least if they could one work of art.

The Chairman thought that, except in a few cases, they could not call the architecture of Belfast art. It was rather of the nature of a hereditary utilitarianism.

Sir Otto Jaffe moved a vote of thanks to the lecturer, and believed if they should have the good fortune to visit any of the places touched upon they would be able to recall the instruction they had received that night with particular pleasure.

Mr. Gray said that variety was an element of beauty in architecture, as it was in nature. In his opinion the departures from perpendicular, horizontal, and straight lines detected in the ruins of ancient Grecian and other buildings, were the result of pressure, heat, and natural decay, and not to the intentional design of the architect. Symmetry and not assymmetry seem to have been the rule with the Greeks.

Mr. W. J. Fennell offered his tribute of thanks to the lecturer for his valuable paper. He took exception to the praise bestowed on the irregular designs of Pisa, and considered the attempt of its builders to enhance the perspective defeated its object, and compared its "crossing" and heavy looking dome to that of Ely, considered that the latter was immeasurably superior, and without laboured attempts at perspective. He also considered that the irregular arcading of Pisa had not the same good effect as the more regular design of Gloucester. That the art was not altogether "lost" he instanced that the modern classic columns always bore evidence of the "swelling" required for the perfect harmony that the eye demanded.

Mr. R. May said that it was a well known rule and principle in all good carving shops in the executing of freize ornament or good panels, where it was desired that the ground should appear flat, a fulness of over a sixteenth of an inch to the foot was left in the centre, where, had the ground been finished quite flat, a weak or hollow appearance is the result. This principle must have been handed down from very early times.

Mr. R. A. Dawson desired to add a word of thanks to the lecturer for coming amongst them, and pointing out the various refinements in architecture which were so easily neglected. With the lecturer he believed in the unity of the arts, and that all the arts clustered round architecture. He was glad that this

was being more and more recognised in our schools of art. In their own school at Belfast they had special classes for architecture, and in order to get this unity in art work architectural students were encouraged to study other branches of work, and students in other classes were encouraged to study architecture, so as to see its bearing on their own special craft. No doubt we lived in a mechanical and material age, tending to a loss of refinement, and the stamping out of humanity and life in art. What we wanted nowadays to bring back the refinement mentioned by Mr. Coffey, was more recognition of the human element in art work, as against the merely mechanical ; more hand work as against machine work; more work in situ as opposed to that worked out entirely in the studio or office, and more craftsmen who were also designers, and not mechanical copyists of designs by other men, with which they had no sympathy. He had pleasure in supporting the vote of thanks.

The motion was heartily passed, and the lecturer, in replying, said he had only been able to touch the fringe of the subject, and he referred those who would like to study the subject to the Brooklyn Institute of Fine Arts' memoirs on the subject, which they would probably find in the library.

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Thompson, John, J.P., Mount Collyer,	do.
Turpin, James, Waring Street,	do.

Report and Proceedings

OF THE

BELFAST

NATURAL HISTORY & PHILOSOPHICAL SOCIETY

FOR THE

SESSION 1903-1904.

BELFAST:
PRINTED BY ALEX. MAYNE & BOYD, 2 CORPORATION STREET.
(PRINTERS TO QUEEN'S COLLEGE.)

1904.

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Belfast Natural History and Philosophical Society.

ESTABLISHED 1821.

CONSTITUTION.

The membership of the Society consists of Shareholders in the Museum, Annual Subscribers (Associates), Honorary Members and Honorary Associates.

Shares in the Museum cost £7 each. A holder of one Share pays an annual contribution of ten shillings ; a holder of two Shares (in one certificate) an annual contribution of five shillings ; while a holder of three or more Shares (in one certificate) is exempt from annual payments. Shares on which the annual payments as above are in arrear are liable to forfeiture. The Council retain the right to decline to consolidate two or more share certificates into one certificate.

Annual Subscribers (Associates) pay £1 1s. (one guinea) due 1st November in each year in advance.

A General Meeting of Shareholders in the Museum is held annually in May or June, or as soon thereafter as convenient, to receive the Report of the Council and the Statements of Accounts for the preceding year, to elect members of Council to replace those retiring by rotation or from other reasons, and to transact any other business incidental to an annual meeting. Shareholders only are eligible for election on the Council.

The Council elect, from among their own number, a President and other officers of the Society.

Each Member has the right of personal attendance at the ordinary lectures of the Society, and has the privilege of introducing two friends for admission to such ; and he has also the right of access to the Museum and Library for himself and family residing under his roof, with the privilege of granting admission orders for inspecting the collections in the Museum to any person not residing in Belfast or within five miles thereof. The session for lectures extends from November till May.

The Museum, College Square North, is open daily for the admission of visitors, for such hours as the Council may from time to time decide ; the charge for admission to non-members is sixpence each. The Curator is in constant attendance, and will take charge of any donation kindly presented to the Museum or Library.

Any further information required may be obtained from the Honorary Secretary.

Belfast Natural History and Philosophical Society.

ANNUAL REPORT, 1903-4.

The Annual Meeting of the Shareholders was held on 20th June, 1904, in the Museum, College Square North. Professor Symington, M.D., F.R.S., F.R.S.E., President, occupied the chair, and amongst those present were—Rev. Dr. Hamilton (President Queen's College); Dr. John MacCormac; Messrs. John Ward, J.P., F.S.A.; Geo. Kidd, J.P.; R. M. Young, J.P. (Hon. Secretary); John Horner, J.P.; J. H. M'Ilwaine, John Carson, Robert Patterson, M.R.I.A.; W. Gray, M.R.I.A.; W. H. F. Patterson, R. A. Kyle, W. Swanston, F.G.S.; J. E. Magill, and H. C. Montgomery.

The Hon. Secretary, Mr. Robert M. Young, M.R.I.A., J.P., read the Annual Report, which was as follows :—

The Winter Session was opened in the Museum on the 3rd November, 1903, when the President, Professor Johnson Symington, M.D., F.R.S., gave an inaugural address, subject, "John Grattan: an Appreciation of his Scientific Work," with illustrations. The second meeting was held on the 1st December, when Professor J. W. Byers, M.A., M.D., delivered a lecture, subject, "Sayings, Proverbs, and Humour of Ulster." The third meeting took place on the 28th of January, 1904, when Mr. John M. Finnegan, B.A., B.Sc., gave a lecture on "Radium," illustrated by experiments, &c. The fourth meeting was held on 17th February, when a lecture was kindly given by Mr. R. Lloyd Praeger, B.A., B.E.,

M.R.I.A., subject, "A Historic Trial: the Limavady Gold Ornaments Case." Fac-similes of the gold objects were exhibited. Mr. W. Swanston, F.G.S., Vice-President, occupied the chair in the unavoidable absence of the President. The fifth meeting took place on the 22nd March, when Mr. Seaton F. Milligan, M.R.I.A., delivered a lecture, subject, "Around Youghal and the Blackwater with the Royal Society of Antiquaries," illustrated with a special series of lantern views. The closing meeting was held on 26th April, when two papers were read—1. "The National Expenditure on the Maintenance of Gulls," by Mr. John Brown, F.R.S. 2. "Blinking or Ill-wishing," by Mr. John M'Kean, B.A. (Oxon.). Professor Gregg Wilson, D.Sc., then gave an account of the work done as our delegate of the allied societies at the last British Association meeting.

The attendance of members and of the general public at all these meetings was good. The various societies holding their meetings in the Museum continue to do so, and the Ulster Amateur Photographic Society have taken over the rooms on ground floor formerly occupied by the Naturalists' Field Club.

At the Easter holidays the Museum was opened as usual at a nominal charge and the attendance was fully as numerous as in recent years.

On the occasion of the Royal Visit to Belfast in last July your Council prepared a loyal address, which was presented to their Majesties, King Edward VII. and Queen Alexandra, by Sir R. Lloyd Patterson, D.L., and the Honorary Secretary, on behalf of the Society. and was graciously acknowledged.*

Since the last Annual Meeting the Society has to deplore the loss of several of its oldest members. Sir James Musgrave, Bart., was a warm friend of the Society and his time and purse were always at its disposal when required. Messrs. D. B. Lytle and Walter H. Wilson also took a lively interest in its welfare. Dr. John Purser, a former president and for many years on the Council, will also be much regretted, as until his removal to

* The text of this address is appended below.

Dublin he took much interest in the work of the Society. Mr. James O'Neill, M.A., and Mr. H. H. Bottomley, who passed away during the year, were both valued members of long standing, while Mr. Davys Bowman had more recently joined the Society. The death of Mrs. Bryce, in August last, severed another link with the past history of the Society, as her husband, Dr. James Bryce, was one of the early members and a former secretary. His portrait was presented by his widow to the Museum some years ago.

Your Council were much gratified to know that your Curator's scientific researches have received well-merited recognition from the Linnean Society of London, of which he has been elected an Associate. Advantage was taken of the occasion by some members of your Society and of the Belfast Naturalists' Field Club to present Mr. Stewart with a testimonial at the last meeting on 26th April.

During the year a good number of plants have been mounted for the local herbarium. Many of these are to replace unsatisfactory specimens already in the collection, but many are of the rarer Irish species, including the set recently presented by Mr. R. Lloyd Praeger. These were collected lately in Antrim and Down, and are additions to the lists of those counties. Some progress has been made in remounting and labelling the large collection of foreign mollusca and echinodermata, and a considerable amount of time has been occupied in replacing the labels in the different rooms of the Museum.

Amongst the donations to the Society of special interest are two fragments of papyrus from Oxyrhynchus presented by the Egyptian Exploration Fund, through the good offices of Mr. John Ward, J.P.

In accordance with the constitution of the Society, five members of Council now retire from office, four of whom are eligible for re-election.

Mr. W. H. F. Patterson, Honorary Treasurer, submitted the financial statement, which showed that the accounts for the year

ending 30th April, 1904, had been closed with a balance on hand of £15 3s. 3d.

Mr. John Ward, in moving the adoption of the Report and Statement of Accounts, said that on his recent visit to Egypt he was requested by Professor Maspero to obtain photographs of any existing portraits of the late Dr. Edward Hincks, the great Egyptologist, in order that a distinguished sculptor might be employed to make a bronze bust which would be erected along with those of Mariette and Champollion in the Museum at Cairo. Professor Maspero said that as Hincks was one of the pioneers of the knowledge of Egyptology he considered it right that his bust should be enshrined in the greatest Egyptian museum in the world. As Dr. Hincks was one of the founders of that Society, and as their Museum was full of his works, especially the translation of the inscriptions upon the Egyptian mummy, he (Mr. Ward) thought this information must be very interesting to his admirers in his native town.

The President of Queen's College, who seconded, said it seemed to him it was very important that Belfast should have a society like that, for it provided for men who were engaged in different pursuits in natural history, philosophy, and other departments of science, an excellent medium for the promulgation and discussion of their views. The Society had now been in existence for a great many years, and had had connected with it not a few distinguished men. The reports laid before them that day show that, although it was getting older it was still bringing forth fruit in its old age. Indeed the proceedings of last session could scarcely have been other than successful. On the bridge of the vessel they had a most excellent commander in Professor Symington, and in the Secretary they had a most experienced and capable man at the wheel. They all lamented that day that they had lost by death so many old and respected members. Their removal had been referred to from time to time at the winter meetings; but he thought they ought again that day to pay another passing tribute to their memory. They would not see their familiar faces again,

but he could not help expressing the hope that their places would be supplied by others able and willing to do something for the advancement of science. The financial position of the Society seemed to be fairly satisfactory, although the balance was rather less than last year. He was perfectly certain they were all delighted at the mention in the Report of their old friend Mr. S. Stewart, a man whose modesty prevented him from being as well known as he deserved to be. In his knowledge of botany he was unsurpassed by anyone in the North of Ireland. Indeed, he was entitled to be classed among the most eminent botanists in the United Kingdom. He happened to know that in a few days there would be made known another well-deserved honour which was to be bestowed on Mr. Stewart, but of that he was not at present at liberty to say more. He was sure they would all congratulate their old and esteemed friend on the well-deserved distinction he had achieved during the past winter, and they sincerely hoped he might long be spared to help forward the work of the Society and of the Museum.

The motion was carried.

The Secretary then said there were five vacancies on the Council of Management, and the following gentlemen, who were retiring members, were eligible for re-election:—Sir R. L. Patterson; Messrs. J. H. Davies, John Horner, and R. Young. The other vacancy was caused by the retirement of Mr. Joseph Wright, who did not seek re-election, and in his place the Council had nominated Professor Morton, who had been a very warm friend of the Society, and had given one or two lectures, which were much appreciated.

On the motion of Mr. Gray, seconded by Mr. George Kidd, these gentlemen were unanimously elected.

The Secretary said since the last meeting the Society had received gifts as follow:—From Mr. Robert Bell, a specimen of the rare mineral dopplerite, recently discovered by the donor at Randalstown; a large fossil nautilus from the lias at Waterloo, near Larne; and a very fossiliferous block of lias limestone from

the same place. From Mr. R. Lloyd Praeger, M.R.I.A., a number of the rare plants recently found by the donor, mainly in Down and Antrim. From Mr. T. S. Hall, M.A., Melbourne University, a number of Australian marine shells. From Mr. J. R. Bristow, a number of geological specimens.

Mr. W. Gray, in proposing a vote of thanks to these gentlemen, said the principal gifts to the Society in former times had come from intelligent citizens who had travelled abroad, and he was glad that the practice still survived, as was evidenced by the travels of their old friend, Mr. John Ward, who had been in Egypt, where he had done good work. Mr. Ward had remembered the Society in his travels, and had been the means of obtaining very valuable contributions, for which they were much obliged.

Mr. J. H. M'Ilwaine seconded, and said if it were better known that such donations were acceptable they might get more of them. He would undertake to give a tomtit's nest built in an elm tree, which, judging from the marks, had been there for twelve years.

The motion was agreed to.

Dr. MacCormac next moved a vote of thanks to the Chairman, who, he said, had done much in the cause of science, and was an honour to the Society. He need not attempt to give expression to any feelings of his own concerning Professor Symington's merits, as they were known to all of them, and he would therefore content himself by moving a hearty vote of thanks to him for the manner in which he had discharged his duties during the year.

The motion, seconded by Mr. John Horner, was carried with acclamation, and, in responding,

The President said he did not propose to detain them at any length by reviewing the present condition or the future prospects of the Society. He thought their presence there was an evidence that it was doing a good and useful work, and was worthy of their support. It behoved all of them, however, to endeavour to secure for the Society a greater amount of support than it had yet received. Practically that was the only Society of the kind which they had in Belfast, and it certainly ought to receive from the

inhabitants of the city a very much larger measure of assistance. There were various duties devolving on the Society, such, for instance, as the maintenance of the Museum and the diffusion of general information with regard to scientific progress. No one could be at all familiar with the character of museums in other towns without feeling that they really required, not exactly to put their house in order—a considerable part of it was already in order—but undoubtedly they still wanted more means to further improve the character of the Museum. That institution must form a very interesting record of the conditions of nature and the social state of the people in future times. It would undoubtedly some day or other form the nucleus of a very large and important museum, and if the specimens there were not taken proper care of their loss would be irreparable. It would be quite impossible to replace many of the existing specimens. He would like to direct their attention to the fact that the Museum was threatened with some damage owing to the erection of the municipal building on the opposite side of the road. They all recognised the importance of that institution, and wished it all success, but they trusted that they would receive some compensation from the city for any injury that the Museum might suffer by its construction. Another matter he might refer to was the noise caused by passing vehicles on the street. He thought that if wood pavement were laid down it would do a great deal to do away with the present cause of complaint. Personally he could only thank them for the honour they had done him in electing him as their President, and for the support they had given to him during his term of office.

At a subsequent meeting of the Council Mr. W. H. F. Patterson resigned his office as Hon. Treasurer, and Mr. John Horner, J.P. was appointed to succeed him. Professor Symington, M.D.,F.R.S., F.R.S.E., was re-elected President, and the following Vice-Presidents were also chosen for another term :—Rev. Dr. Hamilton, M.A., D.D., LL.D. (President of Queen's College), Sir R. L. Patterson, D.L., J.P., F.L.S., Mr. W. Swanston, F.G.S., and Mr. Robert M. Young, J.P., C.E. For the position of Hon. Librarian,

Mr. J. H. Davies was selected, and for Hon. Secretary Mr. R. M. Young, B.A., J.P., M.R.I.A.

To their Most Gracious Majesties Edward VII., by the grace of God of the United Kingdom of Great Britain and Ireland, King, and Queen Alexandra.

May it please your Majesties—In the name and on behalf of the Belfast Natural History and Philosophical Society, we, the members of Council, desire to express the pleasure and satisfaction we so cordially feel at your Majesties' visit to Ulster, and to offer our most respectful and sincere welcome to the city of Belfast. We fully recognise the importance of your Majesties' Royal progress through Ireland, and entertain the most sincere conviction that it will be productive of much permanent good to our country. Our Society was formed in 1821 for the cultivation of geology, botany, and mineralogy in all their branches, more especially the investigation of the natural history and antiquities of Ireland. In later years our efforts have been more especially directed to the advance of science and the spread of knowledge among the people. We cannot but feel encouraged to greater zeal by observing the practical interest your Majesties take in the social and intellectual improvement of your subjects, and the encouragement your Majesties accord to the progress of scientific research at home and abroad. In conclusion, we would again assure your Majesties of our devotion to your Majesties and to all the members of the Royal family. Wishing your Majesties long life and every prosperity, we have the honour to remain your Majesties' most humble, loyal, and devoted servants.

(Signed on behalf of the Belfast Natural History and Philosophical Society.)

Johnson Symington, President.
Robert M. Young, Secretary.

EDUCATIONAL ENDOWMENTS (IRELAND) ACT. 1885, 48 & 49 Vict. ch. 78.

The Account of the Council of the Belfast Natural History and Philosophical Society for the year ended 30th April 1904.

Dr. **Cr.**

CHARGE.

	£ s. d.	£ s. d.
To Balance as per last Account		£58 13 0
,, Amounts received during the period in respect of Donations, Bequests, or other Endowments		2 12 6
,, Subscriptions		107 7 0
,, Dividends		17 2 0
,, Rents		26 16 6
,, Fees		0 1 6
,, Realized by Sales		0 1 6
,, Miscellaneous Receipts, viz.:—		
Cash refunded	£0 1 6	
Admission Fees during year	23 0 0	
,, ,, at Easter	19 13 2	
		42 14 8
Total		255 8 8

DISCHARGE.

	£ s. d.	£ s. d.
By Amounts of Payments under the following headings:—		
Maintenance of Premises, &c	£19 6 10	
Rent and Taxes, &c.	28 3 10	
Salaries	109 7 10	
Advertising	5 12 5	
Postage and Carriage	4 7 10	
Fuel and Gas	16 2 2	
Printing and Stationery	5 2 2	
		188 3 1
Other Payments, viz.:—		
British Association Committee—Refund	4 9 8	
Commission on Cheques	0 0 9	
S. A. Stewart—Donation	5 0 0	
J. Vinycomb, for address to King	2 12 6	
Typewriter ,, ,,	0 2 6	
Insurance—£2 12s. 6d.; £1 19s. 9d.; £1 19s. 9d.	6 12 0	
Stamping Two Agreements	0 3 0	
Cheque Book	0 4 2	
Mayne & Boyd—Printing Report	17 18 2	
W. & G. Baird—for Blocks	1 18 9	
Lizars—for Lanterns	0 14 0	
Mayne & Boyd—Printing Guide	6 10 0	
Subscription—*Irish Naturalist*	1 1 0	
Expenses at Easter	4 15 10	
		52 2 4
Total Payment		240 5 5
,, Balance in favour of this Account as on the 30th April, 1904		15 3 3
Total		£255 8 8

N.B.—Besides the above Balance there is a sum of £400 standing to the credit of this Account in the York Street Flax Spinning Co., Ltd., 4½ per cent, Debenture Stock

We certify that the above is a true Account.

ROBERT M. YOUNG, Governor.

W. H. FERRAR PATTERSON, Accounting Officer.

Dated this 14th day of May, 1904.

I certify that the foregoing Account is correct.

J. F. MAYNE, Auditor.

2nd day of June, 1904.

DONATIONS TO THE MUSEUM, 1903-1904.

From Mr. R. Lloyd Praeger, M.R.I.A.

A number of rare plants found in the North of Ireland.

From The Egyptian Exploration Fund.

Second Century Document, and Homeric Fragment ; also carving in limestone, and various specimens from the recent excavations at Abydos, Egypt.

From Mr. J. R. Bristow.

Vegetable Ivory, and Geological specimens.

From Mr. Henry Craig.

Specimen of *Sphinx convolvuli* captured in a house in Belfast.

From Mr. Lionel L. Fletcher, Caterham, Surrey.

Plaster-cast of an Irish token, the "Belfast Ticket," in the possession of Mr. L. L. Fletcher.

From Mr. Robert Welch.

A number of the rarer recent Irish shells.

From Mr. Robert Patterson, M.R.I.A.

Contents of a Pellet, cast up by a Herring Gull.

From Lord Shaftesbury.

Ancient Leaden Trunkhead of a Spout, from John M'Cracken's Cotton Mill, Donegall Street.

From Mr. Robert Bell.

Specimen of the mineral *Dopplerite*, from Sluggan Bog, near Randalstown. Specimen of a fossil *Nautilus*, from the Lias, at Larne, also a fossiliferous block of Lias Limestone from Carr's Glen, Belfast.

ADDITIONS TO THE LIBRARY, 1st May, 1903, till 1st May, 1904.

Adelaide.—Transactions of the Royal Society of South Australia. Vol. 27, parts 1 and 2, 1903.
From the Society.

Albany.—Fifty-fourth Annual Report of the New York State Museum. Vols. 1—4, 1900, and 55th Annual Report, 1901; also Index to Publications, 1903.
The Director.

Austin.—Transactions of Texas Academy Science. Vol. 3, 1900, and vol. 4, part 1, Nos. 1—8, 1900-1901.
The Academy.

Basel.—Verhandlungen der Naturforschenden Gesellschaft in Basel. Vol. 15, part 2, 1904. *The Society.*

Belfast.—Report and Proceedings of the Belfast Naturalists' Field Club. Ser. 2, vol. 5, parts 1 and 2, 1904.
The Club.

Berkeley.—University of California Publications. Vol. 1, part 1, 1902. *The University.*

Bergen.—Bergens Museum Aarsberetning for 1902, and Aarbog for 1903, parts 1—3, 1903-1904; also Crustacea of Norway. Vol. 5, parts 1 and 2, 1903.
The Museum Director.

Birmingham.—Records of Meteorological Observations for 1902 and 1903, by A. Cresswell, Curator of the Observatory. *Birmingham Institute.*

Boston.—Memoirs of the Boston Society of Natural History. Vol. 5, No. 8, 1902, and No. 9, 1903. Proceedings, vol, 3, Nos. 3 and 7, 1902, and No. 1, 1903,
The Society.

BOULDER.—University of Colorado College Studies. Vol. 1, Nos. 3 and 4, 1903. *The University.*

BREMEN.—Abhandlungen herausgegeben vom Naturwissenschaftlichen Verein zu Bremen. Vol. 17, part 3, 1903. *The Society.*

BRESLAU.—Zeitschrift für Entomologie vom Verein für Sclessiche Insektenkunde zu Breslau. New series, part 28, 1903. *The Society.*

BRIGHTON.—Report of Brighton and Hove Natural History and Philosophical Society, 1903. *The Society.*

BROOKLYN.—Science Bulletin of the Brooklyn Institute of Arts and Sciences, No. 2, 1902, and Monographs, 1 and 2, 1903. *The Institute.*

BRUSSELS.—Annales de la Société Royale Malacologique de Belgique. Vol. 37, 1902. *The Society.*

,, Annales de la Société Entomologique de Belgique. Vol. 46, 1902. *The Society.*

BUENOS AYRES.—Anales del Museo Nacional de Buenos Aires. Ser. 3, vol. 1, parts 1 and 2, 1902. *The Director.*

BUFFALO.—Bulletin of Buffalo Society of Natural Sciences. Vol. 8, Nos. 1—3, 1903. *The Society.*

CALCUTTA.—Memoirs of the Geological Survey of India. Vol. 34, part 3, and vol. 35, part 2, also General Report and Index, 1903. Palæontologia Indica, ser. 9, vol. 3, part 2, No. 1, and ser. 15, vol. 1, part 5, 1903. *The Director of the Survey.*

CAMBRIDGE.—Proceedings of the Cambridge Philosophical Society. Vol. 12, part 3, 1903, and parts 4 and 5, 1904; also List of Fellows, 1903. *The Society.*

CAMBRIDGE, MASS.—Bulletin of the Museum of Comparative Anatomy. Vol. 39, Nos. 6—8, 1903; vol. 40, Nos. 6—7, 1903; vol. 41, No. 2, 1904; vol. 42, Nos. 1—4, 1903, and No. 5, 1904; vol. 43, No. 1, 1904, and vol. 45, No. 1, 1904; also Annual Report, 1903. *The Keeper of the Museum.*

CARDIFF.—Transactions of Cardiff Naturalists' Society. Vol. 34, 1902, and vol. 35, 1903. *The Society.*

CASSEL.—Abhandlungen und Bericht der Vereins für Naturkunde zu Kassel. Vol. 48, 1903. *The Society.*

CHRISTIANIA.—Forhandlinger i Videnskabs Selskabet i Christiania, 1902.
The Royal Norske Frederiks University.

CINCINNATI.—Bulletin of the Lloyd Library, No. 6, 1903; also Mycological Notes, Nos. 10—12, 1902, and Nos. 13 and 14, 1903. *The Messrs. Lloyd.*

COLORADO SPRINGS.—Colorado College Studies, 1903.
Colorado College Scientific Society.

DUBLIN.—Scientific Transactions of the Royal Dublin Society. Ser. 2, vol. 8, Nos. 2—4, 1903. Scientific Proceedings. New Series, vol. 10, part 1, and Economic Proceedings. Vol. 1, part 4, 1903.
The Society.

EDINBURGH.—Proceedings of the Royal Society of Edinburgh. Vol. 22, 1889-1901. *The Society.*

" Proceedings of the Royal Physical Society. Session 1901 1902. *The Society.*

EMDEN.—Jahresbericht der Naturforschenden Gesellschaft in Emden, 1903. *The Society.*

GENOA.—Rivista Ligure di Scienze, Littera ed Arti. Anno 25, fasc. 2—6, 1903, and Anno 26, fasc. 1, 1904.
Societa Letture e Conversazione Scientifiche.

GLASGOW.—Proceedings of the Royal Philosophical Society of Glasgow. Vol. 34, 1903. *The Society.*

GOTHENBURG.—Goteborg's Kungl Vetenskaps Och Vitterhets Samhalles Handlingar. Parts 5 and 6, 1898.
The Society.

HALIFAX.—Proceedings and Transactions of the Nova Scotian Institute of Science. Vol. 10, parts 3, 1902, and 4, 1903. *The Institute.*

HAMBURG.—Abhandlungen aus dem Gebiete der Naturwissenschaften herausgegeben vom Naturwissenshaftlichen Verein in Hamburg. Vol. 18, 1903; also Verhandlungen, 1903-04. *The Society.*

IGLO.—Jahrbuch des Ungarischen-Karpathen Vereines, 30th year, 1903. *The Society.*

INDIANOPOLIS.—Proceedings of the Indiana Academy of Science, 1901. *The Academy.*

KHARKOW.—Proceedings of the Society of Physico-Chimiques of Kharkow University. Nos. 25—31, 1901-1903. *The Society.*

LAUSANNE.—Bulletin de la Société Vaudoise des Sciences Naturelles. Ser. 4, vol. 39, Nos. 146—148, 1903. *The Society.*

LAWRENCE.—Bulletin of the University of Kansas. Vol. 3, Nos. 6—8, 1901-02. *The University.*

LEICESTER.—Thirteenth Report of Leicester Museum and Art Gallery, 1902. *The Director.*

LEIPSIC.—Mitteilungen des Vereins für Erdkunde zu Leipzig, 1902; also Wissenschaftliche Veroffentlichungen. Vol. 6, 1904. *The Society.*

LIMA.—Boletin del Cuerpo de Ingenieros de Minas del Peru, No. 2, 1902, and Nos. 3 and 4, 1903. *The Director.*

LONDON.—Report of the British Association Seventy Second Meeting, Belfast, 1902. *The Association.*

,, Quarterly Journal of the Geological Society of London. Vol. 59, Nos. 2—4, 1903, and vol. 60, No. 1, 1904; also List of Fellows, 1903 *The Society.*

,, Journal of the Royal Microscopical Society. Parts 3—6, 1903, and parts 1 and 2, 1904. *The Society.*

,, Transactions of the Zoological Society of London. Vol. 16, part 8, and vol. 17, parts 1 and 2, 1903. Proceedings for 1902, vol. 2, part 2, and vols. 1 and 2, 1903; also List of Fellows, 1903. *The Society.*

MADISON,—Bulletin of Wisconsin Geological and Natural History Survey. Economic Series, Nos. 5 and 6, 1903, and Educational Series, No. 2, 1902. *The Director.*

MADRAS.—Bulletin of Madras Government Museum. Vol. 4, No. 3, 1903, and Administration Report for year, 1902-1903. *The Superintendent.*

MANCHESTER.—Journal of the Manchester Geographical Society. Vol. 18, Nos. 4—12, 1902, and vol. 19, Nos. 1—3, 1903. *The Society.*

„ Transactions of the Manchester Geological Society. Vol. 28, parts 4—8, 1903, and parts 9—12, 1904. *The Society.*

MARSEILLES.—Annales de la Faculte des Sciences de Marseille. Vol. 13, 1903. *The Librarian.*

MELBOURNE.—Proceedings of the Royal Society of Victoria. Vol. 16, part 1, 1903, and part 2, 1904. *The Society.*

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BELFAST
NATURAL HISTORY & PHILOSOPHICAL SOCIETY
SESSION 1903-4.

3rd November, 1903.

ADDRESS BY THE PRESIDENT,

PROFESSOR JOHNSON SYMINGTON, M.D., F.R.S., F.R.S.E.

JOHN GRATTAN: A SKETCH OF HIS WORK AS A CRANIOLOGIST.

LADIES AND GENTLEMEN,—My first duty is to offer my warmest thanks to the Council for the honour they have conferred upon me in electing me President of this Society. It is certainly an honour to be identified with the government of an Institution which has existed for more than 80 years without state aid or municipal support, whose object is the extension of a knowledge of nature and of art, and the encouragement of learning and research, and which during this period has received not only the sympathy, but the active support, of such men as Thomas Andrews, William Thompson, Robert Patterson and Wyville Thomson. I am fully aware that I have done but little to deserve this honour, and that the invitation so cordially extended to me was intended quite as much as a compliment to the College which I have the honour to serve, as to myself personally. Indeed, it was the consciousness of this fact that led me to accept a position for which my other duties leave me but little time to discharge as I should wish.

Many of those who have contributed to our proceedings have been engaged in some industrial or professional occupation, but have found a change of thought and a relaxation from their ordinary work in the study of some department of the physical, or of the biological sciences. They have been the fortunate possessors of a scientific hobby, which they followed without any idea or hope

of material gain. Fortunately for the progress of science, and the prospects of a general recognition of the intellectual and material value of scientific research, such men have always existed in our midst, and this Society is justly proud of having enrolled amongst its members not a few who have made important and valuable contributions to the sum of human knowledge. During its earlier history our Society was singularly fortunate in this respect. The work of some of these pioneers is well known locally, and has received general recognition in scientific circles, while the labours of others have not only failed to gain that amount of credit to which they are justly entitled, but are even in danger of being entirely ignored. Amongst the latter I would place the investigations of John Grattan, and I desire to take this opportunity of attempting an appreciation of his scientific work. I do so with the more confidence, since it involves questions to which I have personally devoted some attention.

John Grattan was born in 1800 in the neighbourhood of Dublin and he obtained the diploma of the Apothecaries' Hall about 1823.

The reasons, given to me on excellent authority, for his starting business in Belfast may be of interest to some, although not entirely creditable to the state of pharmaceutical science at that time in this city. It appears that Grattan had decided to settle in some provincial town in Ireland, and with this object in view he visited various places accompanied by his employer's son. In the course of their travels these young men came to Belfast and going into a druggist's shop in the centre of the town one of them asked for a pennyworth of Epsom's salts. The attendant took down a bottle from one of the shelves, extracted a handful of the salt which he placed on a fragment of a newspaper and secured by gathering up the edges of the paper and twisting them round one another. As soon as they left the shop Grattan's companion turned to him and said "Belfast is the place for you."

Grattan came here in 1825, and at that time there were, of course, no railways to the town, while the population was only about one-tenth of what it is now. According to tradition he

arrived on a stage-coach with a large bottle, similar to those still shown in many chemists windows, between his legs. Grattan was not only the founder of the well-known firm which still bears his name, but he also started the manufacture of the now celebrated Belfast aerated waters, which for many years were exclusively manufactured by his firm. I mention these facts to show that his scientific tastes and pursuits did not prevent him from conducting his business with marked ability, enterprise and success.

During his long residence here, Grattan took an active interest in the existing literary and scientific societies. Thus he was President of the Belfast Literary Society during the session 1843-4, and read two papers on phrenology—one on the 2nd May, 1842, entitled, "Phrenological Ethics," and the other on 12th February, 1844, "Phrenological observations on the treatment of criminals.' For many years he was an office-bearer in our Society, to which he contributed three papers. His first communication "On the importance, to the Archæologist and Ethnologist, of an accurate mode of measuring human crania and of recording the results,—with the description of a new Craniometer," was read on the 6th April, 1853, and was published in the *Ulster Journal of Archæology*, Vol. i., 1853, illustrated by 5 plates. Again, on the 20th January, 1858, he read a paper "On some ancient Irish skulls, and on an exact method of taking and recording cranial measurements." Part of this communication was published in the *Ulster Journal of Archæology*, Vol. vi., 1858, with 3 plates, under the title, "Notes on the human remains discovered within the Round Towers of Ulster, with some additional contributions towards a Crania Hibernica." This appears to have been his last contributions to Craniology at our meetings, but in 1860 he gave an interesting demonstration on the oxy-hydrogen light and its uses for illuminating the microscope and throwing pictures upon a screen.

We have just seen that his last published paper on craniology appeared in 1858; but after that date he was engaged in the preparation of another contribution to this subject. He went so far as to print 16 pages of letterpress and to prepare a number of plates. After his death his daughters, the Misses Grattan, bound

into a single volume the various portions of his unfinished work, along with "Notices of the Round Towers of Ulster," by Edmund Getty, M R.I.A., and presented copies to a number of his friends. It was a specimen of this volume, which I obtained from a second-hand bookseller, that first directed my attention to his methods of skull measurement. On enquiry I found that Grattan's work was unknown to many of our leading anatomists and to others interested in physical anthropology, as it had previously been to myself. The cause of this is easily explained. The earlier part of Grattan's investigations appeared in a journal which is not readily accessible to, and is rarely consulted by, the great majority of those interested in craniology, while the later unpublished portion, issued privately, was still less likely to fall into the hands of such workers.

Before proceeding to discuss the nature and value of Grattan's scientific work it is advisable that I should explain, as briefly as possible, the circumstances that led him into this line of research and the problems that were then engaging the attention of anthropologists and ethnologists.

About the time when Grattan came to Belfast, phrenology was at the zenith of its popularity. It is evident from his writings that he was a convert to the theories of Gall and Spurzheim, and indeed he appears to have been personally acquainted with the latter. He collected a large number of skulls and casts of heads, and naturally became interested in the variations in their form.

Further, the long period during which Grattan pursued his craniological investigations witnessed the rise of a scientific ethnology.

Anthropologists began to collect material from barrows, caves and other ancient burial grounds to determine the physical characteristics of their remote ancestors; and to procure specimens and make observations in all parts of the world to ascertain the structural peculiarities of existing races. It soon became evident that for anthropological purposes the skull was the most important part of the skeleton, and attempts were made to utilise certain differences in the form of the skull for purposes of racial classification.

Towards the end of the 18th century Blumenbach had drawn attention to the significance of variations in the form of the skull in different races, but it was reserved for Anders Retzius to place this subject upon a scientific basis. In 1840 he made his first communication to the Academy of Science of Stockholm. Blumenbach had attached special importance to the shape of the anterior part of the skull, such as the forehead and jaws, but Retzius showed that it was even more important to examine the cranium, or that part of the skull which contains the brain. It is to him that we are indebted for the division of skulls into long, or dolichocephalic, and short, or brachycephalic, according to their relative length and breadth. He maintained that the Caucasian race of Blumenbach was a mixed one, since it consisted of both short and long-headed people, the proportion between these two varying in different places according to the degree to which the primitive stock had been invaded, or replaced, by a foreign element. Anders Retzius devoted himself with great energy to the determination of the distribution throughout Europe, both amongst the living races and prehistoric remains, of these two types of heads. His work slowly, but surely, gained general recognition, and before his sudden death in 1860 craniology was engaging the attention of many distinguished workers. Several events which happened about this time tended to create a more general interest in this subject. Thus the discovery in 1857 in a limestone cave in the Neanderthal of the remains of an extinct race whose skulls had a very remarkable form, and in some respects ape-like appearance, raised a keen discussion as to the significance of certain cranial characters, while the publication two years later of Charles Darwin's work "On the origin of species by means of natural selection," inevitably turned men's attention to all biological problems with wider interest and renewed energy.

Grattan's work was almost cotemporaneous with that of Anders Retzius, and nearly all of it was done before the German and French Schools had elaborated their schemes of skull measurements.

The general plan which he devised for this purpose is given in his paper published in 1853, and it is not essentially altered, but

only more fully elaborated in his subsequent contributions to the subject.

The spirit and aims of Grattan's work are so admirably expressed in a paper he published in the *Ulster Journal of Archæology* for 1858 that I cannot refrain from quoting it. After discussing the craniological methods then in vogue he wrote as follows :—

"So far, we look in vain, therefore, for that uniformity of method and that numerical precision, without which no scientific investigation requiring the cooperation of numerous observers can be successfully prosecuted. The mode of procedure hitherto adopted furnishes to the mind at best nothing but vague generalities which it cannot by any intellectual effort reduce into general shape and form ; and until we can accomplish something more than this—until we can record with something approaching towards accuracy the proportional development of the great subdivisions of the brain, as indicated by its bony covering, and by our figures convey to the mind determinate ideas of the relation they bear towards each other we shall not be in a position to do justice to our materials, or to interpret faithfully or profitably the natural hieroglyphs thus submitted to our examination. What we specially stand in need of is some method of measuring cranial forms and magnitudes which by combining perfect simplicity and facility of application with rigid scientific accuracy shall command our confidence ; so that the ethnologist may be able to record his own observations, and to profit by the recorded observations of others without the risk of misinterpretation, and the phrenologist possesses a sound numerical foundation upon which to base his special measurements. But although an improved method of taking and recording cranial measurements would admittedly be of great importance to the phrenologist, to the ethnologist it is absolutely indispensible. The phrenologist can pursue many of his enquiries and test the soundness of most of his inferences, by the aid of detached or isolated specimens, each head itself affording the necessary data by which its mental capabilities may be determined. But the ethnologist has to deal with tribes and nations. He stands somewhat in the position of the actuary who

has to deduce congruous and general laws from an extensive collection of apparently incongruous and heterogeneous facts. In every age, and amongst all races, special individuality of character must necessarily have been accompanied by considerable modifications of typical form so that no single cranium can, *per se*, be taken to represent the true average characteristics of the variety from which it may be derived. It is only from a large deduction that the ethnologist can venture to pronounce with confidence upon the normal type of any race, or reasonably expect to attain in his craniological investigations that measure of completeness necessary to rescue them from their present objectless character, and to impart to his conclusions scientific definiteness and value. If an improved method of measurement be thus desirable when treating of existing races whose crania form but one, though by no means the least important, element for determining the influences that may have contributed to their development and progress, still more necessary does it become when we endeavour to investigate the moral, social and intellectual condition of our remote predecessors, of whom we possess few, if any, records, save such as remain to us in their rude structures and works of art, and in their own osseous remains. These latter are, necessarily, few in number, widely scattered, singularly frail and perishable, and are, day by day, irretrievably disappearing before the unavoidable encroachments of extending civilization. If we are to indulge, therefore, in any well-grounded expectation of our being able to render the fleeting records of the past available for contrast with the more accessible materials of the present, it is of the first importance that our description of such should be as accurate and as free from ambiguity as the nature of the subject will permit—the paucity of our material affording but little prospect of our accumulating the necessary data, unless we can succeed in concentrating upon some recognized scientific plan the detached labours of every competent observer."

Grattan's attention to these questions appears to have been due to the action of his friend Edmund Getty who had collected a considerable number of skulls during his well-known researches

on the Round Towers of Ulster. At Getty's request Grattan agreed to describe these skulls, but like the most of us he found it easier to promise than to perform. As we have just heard, Grattan was convinced that the various methods of measuring skulls then in vogue were too indefinite and incomplete to admit of a thorough and scientific description of individual specimens, or of a comparison of groups of skulls with one another. Accordingly he set to work to frame a new plan of skull measurements, and in so doing he found it necessary to construct a suitable instrument with which to take these measurements. For a number of years Grattan worked at this subject, modifying his methods and improving his instrument, until they were not only greatly in advance of those then in use, but in many respects will bear favourable comparison with those now generally employed.

Through the kindness of Professor Haddon I am able to show you what I believe was the latest and most improved form of Grattan's Craniometer. No account of this instrument has been published, although Grattan prepared a fine illustration and wrote an excellent description of it for a paper which was not completed at his death. He appears to have used this instrument in the preparation of his "Notes on the Round Towers of Ulster, with some additional observations towards a Crania Hibernica," which appeared in the *Ulster Journal of Archæology* in 1858, and it was probably shown before the Society on the 20th of January of the same year. An instrument constructed on much the same principle as the one before you, but differing considerably from it in appearance, was described and figured in the *Ulster Journal of Archæology* for 1853.

I will now endeavour to explain, in a manner as simple and as free from technicalities as possible, the problem with which Grattan had to deal and the main peculiarities of his methods and instrument.

As the cranium is an irregular ovoid box we can obtain data for a rough estimate of its size and general form by measuring its greatest length, breadth and height. Further, by taking its length as 100 we can express the proportions of length to breadth and of

length to height by indices. This plan is adopted in distinguishing between round and long, or flat and high heads. Such a method is simple, and in practice has been found useful in classifying skulls and in distinguishing races. It is obvious, however, that two skulls differing considerably from one another both in capacity and shape might have the same length-breadth and length-height indices. If we examine the median longitudinal arc of the vaulted portion of the skull we find that it passes from the root of the nose upwards and backwards to the vertex forming two curves, with their convexities directed forwards and upwards, it then turns downwards and backwards to the most posterior part of the skull, and finally forwards and downwards to end at the posterior margin of the large hole at the base of the skull through which the brain becomes continuous with the spinal cord. Now, the form of these curves from the nose to the vertex, and from the vertex to the back of the head, may differ greatly in two skulls which have the same length and height. Thus, in one the forehead may be high and protruding, the roof of the skull be directed nearly horizontally for a considerable distance and then descend abruptly to the occiput, while in the other the forehead may be low and retreating, and the longitudinal arc only gain the same height as the other skull for a very short distance before it begins to descend again. The problem was, and indeed still is, How can we best give numerical expression to these differences? The plan often adopted of measuring the length of the three portions of this arc, viz., frontal, parietal, and occipital, gives the respective share the bones so named take in the formation of the arc, and hence may be supposed to show the relative development of the anterior, middle and posterior parts of the vault of the skull. In some skulls, however, owing to irregularity in, or disappearance of, the lines of union between these bones, their respective lengths cannot be definitely ascertained, and in any case such measurements do not show the contour of the arch. For this purpose I believe that the best method yet devised is that of Grattan's. By means of his craniometer the skull is firmly fixed in position by passing two pegs into the external openings of the ears and pressing another screw

against the base of the skull. The skull can then be rotated along with the stage to which it is fixed, round an axis passing through the external auditory openings, or it can be rotated along with its stage round an axis perpendicular to the first. In each case the exact amount of rotation is indicated by a dial. The instrument has a brass carriage, a brass slide and a curved tracer, all suitably adjusted, so that the distance of any part of the median line of the skull from the point where the axis passing from the centre of one ear-opening to the other crosses the median plane, can be read on a graduated scale marked in inches and tenths of inches. Grattan selected as his starting-point, or zero, the distance from this point on the auditory axis to the nasion, or depression just above the root of the nose. After this is ascertained the brass slide is withdrawn, the skull rotated 10°, the brass slide carrying the pointer again pushed towards the skull and the distance measured in the same way as from the nasion. This process of skull rotatiou through 10° and of measurement is repeated along the entire extent of the arc. From such a series of measurements a profile drawing of the skull can be made showing the position of the external auditory meatus and the coutour of the vault at intervals which, in an ordinary skull, are less than an inch apart. If necessary, the skull can be measured at shorter intervals by rotating the skull between each measurement a smaller number of degrees. By other adjustments the same instrument can be used to make a tracing on paper of the external contour of this arc. After the vault has been measured the rotation of the skull can be continued so as to determine the amount of projection of the nose, jaws, and teeth below and in front of the cranium. Grattan measured a number of skulls in this way and compared them with one another in a series of tables showing the proportion of the radial diameters at 10° interval from zero to 180° with the length of the skull estimated at 100°.

It is difficult to imagine a more ingenious and accurate method of measuring this part of the skull.

The length-breadth index expressed by comparing the greatest length of the cranium with its greatest breadth is open to the

same objection as the length-height index which we have just discussed. Thus, in some skulls the greatest transverse diameter is high up on the parietal bones, this means that the sides of the skull have a slight inclination outwards from the base until near the top; in other specimens the lateral walls begin to slope inwards from near the base, so that the greatest transverse diameter is much lower. Further, the maximum transverse diameter may be the same in two skulls, but towards the anterior or smaller end of the oval one of these skulls may be much narrower than the other. To correct these sources of fallacy the transverse diameter is often taken in the frontal as well as the parietal regions, and the level of the greatest transverse diameter is roughly indicated by stating whether this occurs high up between the parietals, or nearer the base between the temporals. It is interesting to see how Grattan recorded these variations of the transverse diameter at different points from before backwards and from below upwards. With his craniometer lines are drawn on the skull from one external ear, opening to the other, opposite selected angular intervals from the nasion. The cranium is thus blocked out into a series of wedges, each having a convex base on the vaulted part of the skull and a sharp straight edge at the auditory axis at the base of the skull. The arched lines over the surface of the skull from one ear opening to the other he called coronal arcs, and he selected for special examination the arcs at intervals of 10°, 30°, 60°, 90°, 120° and 150° from the ear-nasion arc. He divided each of these arcs into three parts of equal vertical elevation, by two lines parallel to their bases, and the extremities of these lines and the base line furnished so many fixed points between which the transverse diameters could be taken.

I must admit that this part of Grattan's method looks somewhat complicated, but it is not so laborious in actual practice as it might at first sight appear. Grattan's own remarks on this point are very characteristic. He writes as follows:—"It may possibly be objected to this method that it involves too large an array of arithmetical figures and demands too great an expenditure of labour; but what was ever yet accomplished, of any value, without

some labour? And if it be desirable to furnish measurements at all (and from the fact that almost every writer upon the subject gives them after some fashion this is manifestly the case), surely it is of some importance that they should be adequate to accomplish the object in view, and at least be so taken and recorded as to convey truthful and intelligible impressions to the mind."—*Ulster Journal of Archæology*, Vol. vi., p. 35.

An examination of present-day craniological methods will show that various attempts are made to amplify and check the data afforded by the greatest length, breadth and height measurements of the cranium. Thus, the transverse diameter is taken between several different points, the chords of the frontal, parietal and occipital arcs are measured, and the lengths of radii drawn from a point on the base of the skull to various spots on the median longitudinal arc of the vault are recorded. The points selected in many cases correspond to the union of certain of the skull bones. These, however, may vary without affecting the general shape and dimensions of the skull, and have not the mathematical precision of Grattan's points. On the whole, it appears to me that for completeness and accuracy, and for facility in making a thorough comparison between the external form of different skulls, Grattan's method, devised about 50 years ago, when craniology was in its infancy, can hold its own against any scheme yet formulated. Curiously enough he made no attempt to measure the diameters of the cranial cavity, or to ascertain how far the inequalities of the outer surface of the skull correspond to those on its inner aspect. Possibly his phrenological view led him to suppose that this question had been settled.

There is one feature in Grattan's method to which I must allude, viz., his selection of the middle of the auditory axis as a starting point from which to measure the various radii and diameters of the cranial vault. The point usually selected for this purpose is the anterior edge of the foramen magnum and on morphological grounds there is much to be said in its favour. It represents, as Huxley long ago pointed out, the posterior end of the true base of the skull, and he used this point from which to

start in measuring the length of the basi-cranial axis and comparing it with the vaulted portion of the cranium. At certain times, however, craniologists have recognised the fact that the external auditory opening presented certain advantages over the anterior edge of the foramen magnum as a basal point from which to measure the cranial vault, and curiously enough this view was adopted very strongly by the late General Pitt-Rivers, who in the last volume of his celebrated "Excavations in Cranborne Chase" wrote as follows in discussing this question :—

"There are other considerations which may perhaps operate in ultimately bringing about a change of system. Mr. Busk, F.R.S., was a strong advocate for measuring from the meatus auditorius and contrived an instrument for this purpose, but it was somewhat clumsy in use and was not generally adopted on that account. His method, however, was sound in principle. No comparison between the skull and the living head can be made by any measurements other than those taken from the meatus. Three profils of living heads taken by my instrument are given in Plates 290 and 292 and they are recognised as striking likenesses of the originals. This instrument is made of aluminium and the legs are movable so as to be light enough for use with a living head. The profile can be taken much more quickly than with Mr. Busk's instrument. There is also this great objection to the anterior margin of the foramen magnum as a base for measurement that in ancient skulls which have been buried for ages it is one of the first parts of the skull to decay, whereas the meatus auditorius is much more frequently preserved and a larger number of skulls can be measured by this method, a point of great importance when it is considered what a small number of the ancient skulls found in tumuli and other places are sufficiently perfect to be available for measurement."

I have been assured by an old friend of Grattan that he had a remarkable aptitude for the construction of mechanical instruments, and his craniometer affords ample proof of the correctness of this opinion. Grattan endeavoured to base his measurements upon mathematical principles and to avoid as far as possible the

selection, as points between which to measure, those liable to vary from irregularities in the sutures on the vault of the skull. Thus in taking the height he did not choose the spot where the frontal and the two parietal bones join, but one on the vault 60° from the nasion. His preference for definite angular intervals is again shown by the fact that he took the length and breadth of the cranium at a horizontal plane passing anteriorly 10° and posteriorly 150° from the nasio-auditory plane as zero. He found such a section usually intersected the cranium at its longest and broadest diameters.

The capacity of the cavity of the cranium is obviously of importance as an index of the size of the brain, but the determination of its amount is subject to various fallacies. The cavity is filled with some material made up of small solid particles, and the quantity needed for this purpose is then measured. Many of the earlier estimates of cranial capacities are very inaccurate owing to the use of unsuitable substance and the absence of proper precautions when filling the cranial cavity and the measures. Grattan's remarks on this subject show the care and thoroughness with which he pursued his investigations. Thus, he states that he tried sand, sago, and mustard seed, but they all gave unsatisfactory results, since none of these indicated the same capacity when the same experiment was repeated. He found, however, that small round shot gave reliable results, and it is interesting to note that this is the material now generally used. Davis & Thurnam, in the first part of their great work, entitled *Crania Britannica*, published in 1856, state that they employed sand. Grattan refers to this fact, and expresses his regret that they did not use a more reliable material.

In addition to devising instruments and methods for taking skull measurements he employed them in the study of numerous Irish skulls. Thus, in the *Ulster Journal of Archæology*, Vol. i., 1853, he had a "Notice of an Ancient Sepulchural Mound." From this Mound which was apparently a pre-christian burial place, he obtained 8 skulls sufficiently well preserved to admit of satisfactory measurements. These specimens were probably all

interred about the same time, and yet they exhibit considerable variations in cranial form. Again, in the same Journal, Vol. vi., 1858, p. 241, he gives a chronological classification of 104 skulls from various Irish sources which he had measured. From an examination of some prehistoric Irish skulls he came to the conclusion that they were divisible into two distinct groups. The majority were long-headed like the majority of the existing inhabitants, and he considers them Celtic. The minority were round-headed, and Grattan agrees with Retzius in holding that these were of "Turanic" origin, had preceded the Celtic population, and have their living representatives in the Fins or Laplanders. He further concluded from the cranial testimony that the Celtic population of Ireland, no matter by how many immigrations introduced, must be originally from one part stock.

It will thus be seen that Grattan belonged to that group of scientific investigators who have endeavoured to ascertain the physical characteristics of the prehistoric races of this country and that his own researches and inventions were calculated to aid in the accurate determination of the differences between the various races of mankind and the zoological position of man himself.

Grattan was an active member and an important contributor to the Proceedings of this Society about half a century ago, and his researches may serve as a typical illustration of the general character of the work of some of its early supporters.

This Society was not founded upon any narrow and merely utilitarian basis and has not limited itself to any one department of scientific work. It has welcomed contributions from those interested in any of the physical or biological sciences, and while glad to receive contributions illustrating the practical application of scientific discoveries to the improvements of our arts and manufactures it has shown an equal appreciation for observations and experiments tending to increase our knowledge of nature and its workings, irrespective of whether or not they were likely to increase our wealth or contribute to our material comfort.

Natural History, Botany, Geology and Ethnology have been

favourite departments of study amongst our members. The gradual accumulation of carefully recorded facts by a multitude of humble workers in these subjects, no less than the capacity for broad generalisations possessed by a few brilliant minds, have taught us the great antiquity of this earth and the gradual evolution of its organic life. Darwin's work on board the "Beagle" and his studies amongst his flowers and his domestic animals must have appeared to many as a useless, if harmless, amusement, and yet what department of human thought and activity has not been influenced by them.

It not unfrequently happens that in the attempts to solve a difficult and complicated scientific problem a frontal attack is as ineffectual, if not as disastrous, as our Generals found it to be at Colenso. The foundations of the science of bacteriology were laid by botanists who probably never dreamed that in the hands of such men as Pasteur it was destined to create a revolution in the treatment of many diseases and in our views of sanitation and preventative medicine.

In these times when the steam engine is disappearing to be replaced by the electric motor we ought not to forget what we owe to such men as Galvani with his apparently trivial experiments with frogs, muscles, and bits of copper and iron. It will be an unfortunate day for our material prosperity, no less than for the progress of science, when the scope and nature of our scientific work is limited to what at the time may appear of practical utility and when the pursuit of truth for its own sake can no longer claim its devotees. Let us hope that this Society will always maintain its high traditions, and will continue to produce members as able, industrious, and energetic in scientific research as John Grattan.

APPENDIX.

The following appendix consists of reprints from some of Grattan's unpublished work. Plate (I) is a drawing of Grattan's craniometer. The explanation of this plate and the description of the method of using the craniometer are reprinted from the paper prepared by Grattan, but unpublished at the time of his death.

Plate II. is reproduced from one made by Grattan to illustrate his method of cranial measurements. It has been reduced to about ⅔rds of the size of the original figure. A somewhat similar illustration will be found in the Ulster Journal of Archæology, Vol. VI., 1858, showing a profile view of the dimensions of Spurzheim's skull.

A table has also been added showing Grattan's scheme of skull measurement; some facial measurements have been omitted.

EXPLANATION OF PLATE I.

GRATTAN'S CRANIOMETER.

A.—A flat Board, 20 inches square, and ¾ths of an inch thick, forming the stand of the Instrument.

B.—A movable wooden foot, 9 inches long, 3 broad, and 1 thick. It narrows to ¼ of an inch in front, where it has affixed to it a brass mounting, which carries the Pivot P.

C.—Nut and screw for securing B to A.

D.—A wooden upright, $12 \times 3 \times 1$ inches, firmly mortised into the foot B.

E.—A brass frame attached to D by means of pivot F, upon which it can be made to rotate in a vertical plane. Its centre (the pivot F), is 9 inches above the board A; and its arms project forward 7¼ inches from D, and are 7½ inches apart.

F.—The pivot and nut which secure E in its place, and allow of its being fitted and rotated at will.

G.—A second brass frame or stage, attached by its extremities to the extremities of E.

HH.—Two screws, passing through the extremities of E and G, constituting the axis upon which G revolves, in a plane always perpendicular to the plane of rotation of E. The inner ends of these screws terminate in smooth cylindrical pivots, of suitable dimensions, to permit of their being introduced into the external auditory foramina. They can be screwed backwards or forwards with the utmost facility; and when adjusted to a skull, are fixed in a postion by means of the nuts II.

II.—Binding nuts, for fixing the stage G firmly to the screws HH, in order that they may rotate with it in its progress.

J.—A brass semicircle, divided into degress, and firmly secured by screws upon the upper arm of E. Its centre coincides with the axis of G, and it is traversed by an index K, secured upon H by the binding-nut L, so as to insure its accompanying H and G in all their movements, the extent of which can thus be read off in degrees.

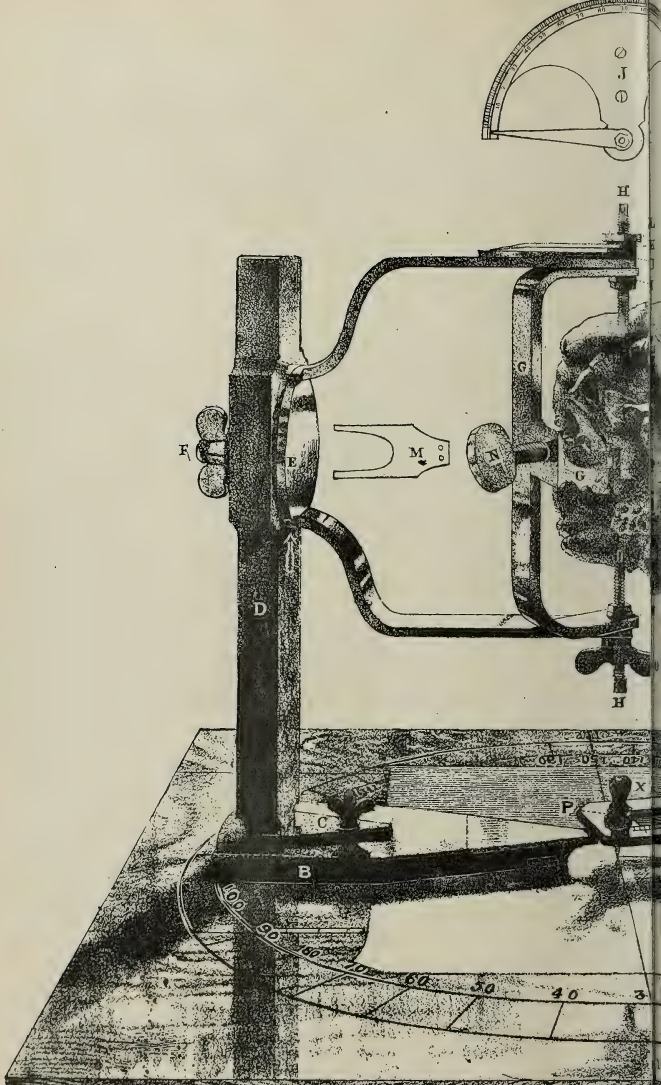
K.—The index attached to the screw H. When E stands in the position in which it is placed in the diagram, the faces of J and K lie horizontally, and consequently only their edges can be seen; but a detached diagram of them is set out separately.

L.—A binding-nut, for fixing the index K in position when adjusted.

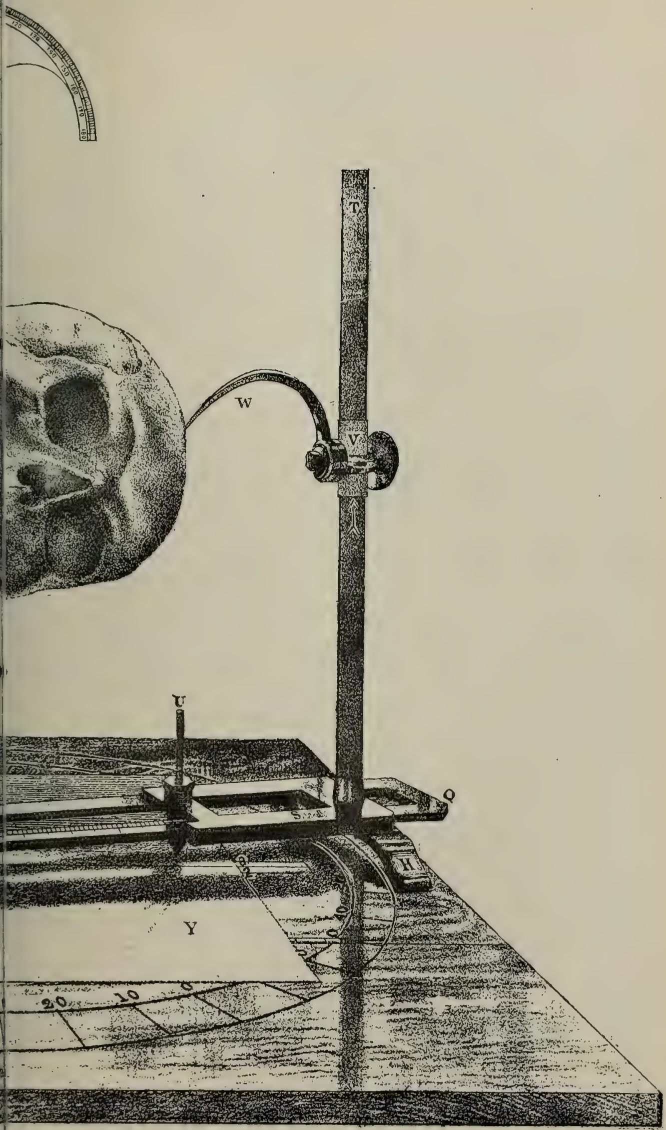
M.—A piece of whalebone 3¾ inches long, 1½ broad, and 2-10ths thick, securely, but slackly attached by twine to the upper surface of the short projecting arm of G, so as to allow it a sort of hinge-like motion. It is imperfectly visible in position in the diagram, but a detached outline of it is given; two dots upon it, and upon G, respectively, indicating the holes by which they are secured to each other.

N.—A thumb-screw passing through G, and pressing against the back of M, by means of which the distance of M from G, and the pressure exerted upon M can be regulated.

PLA



I.



O.—A binding-nut, for securing the stage G in position when its adjustments have been completed.

P.—A pivot, rising vertically from the brass mounting of the foot B. Its centre coincides with the axis of the stage G, when the poles of the latter are placed perfectly vertical, and if extended vertically, would exactly bisect the same axis when adjusted horixontally.

Q.—A brass carriage, 12 inches long and 2¼ broad. One of its extremities is perforated to make it fit pivot P, round which, resting upon B, it moves horizontally; the other extremity resting upon a brass foot, R, which raises its under surface to the level of the top of B. When moved round P, it describes a circle, of which P is the centre, and its left limb is graduated to permit of the distance from P to U being read off in inches and tenths.

R.—The foot upon which Q rests, secured to it by screws.

S.—A brass slide, which travels backwards and forwards in a slot upon the carriage Q, carrying at one end the upright T, and having at the other end a tube for receiving the pencil U.

T.—A perpendicular triangular brass upright. 12½ inches long, attached to S.

U.—A pencil, passing freely through S, which it accompanies in all its movements, with its point resting on the paper Y.

V.—A spring slide, fitting accurately upon, and moving freely up and down T. It carries in front a horizontal pivot, upon which rotates the curved tracer W; and at the back, a binding-screw, to fix it in position when requisite.

W.—A curved tracer, so adjusted as always to have its points in the same perpendicular line as the point of the pencil U.

X.—A pointed steel pin, furnished with a wooden handle. It passes through the exact centre of P; pierces the paper Y; and indicates the precise point from whence all the measurements are taken.

Y.—A sheet of paper, extending under a portion of the foot B; which, when screwed down, holds it firmly in its place.

a 1, and a 2.—Two lines scribed upon the board A. a 1, passing transversely through the eentral point, indicated by X; and a 2, backwards therefrom, and perpendicular to a 1. They enable the paper Y, when correspondingly marked, to be removed, and accurately replaced, if requisite.

To employ this instrument, let the frame E be turned upon its axis, until the axis of G shall be perfectly horizontal, indicated by the mark upon the edge of E; touching the point of the arrow upon D; and by the graduated semicircle J, standing perpendicularly at the left hand of the operator as he faces the upright D: then let the stage G be turned upon its axis, until it depends vertically from the extremities of E, when its projecting arm, carrying the thumb-screw N, will be underneath—the whalebone lever M lying loosely upon it above. If a skull be now placed upon its base, centrically on the stage G, with its face towards the operator, and the screws HH be introduced into the external auditory foramina, the bony palate will rest upon the hinge-end of M; whilst, by means of the thumb screw N, the forked extremity of M can be pressed upon the occipital condyles, with any amount of force requisite to keep the skull fixed and steady. The binding-nuts, II are then to be screwed home, after which the stage G may be rotated completely round its axis, carrying with it the skull, which will not require to be shifted upon the stage in any subsequent operation. Let the carriage Q be now moved, until, upon sliding S backwords and forwards, the point of the pencil U exactly traverses the line A 2. Let it be fixed in this position by passing the pin X through a hole in the foot R, into a corresponding hole in the board beneath, and let the point of the tracer W be adjusted precisely upon a level with the axis of E, which will be when the under edge of the slide V touches the point of the arrow upon T. It will now be manifest, that by rotating the stage G, any portion of the median periphery of the skull may be brought into immediate contact with the point of the tracer W, and the distance of any part of it from the axis of the auditory foramina be read off in inches and tenths upon the graduated scale in Q; the angular distance of any one point from

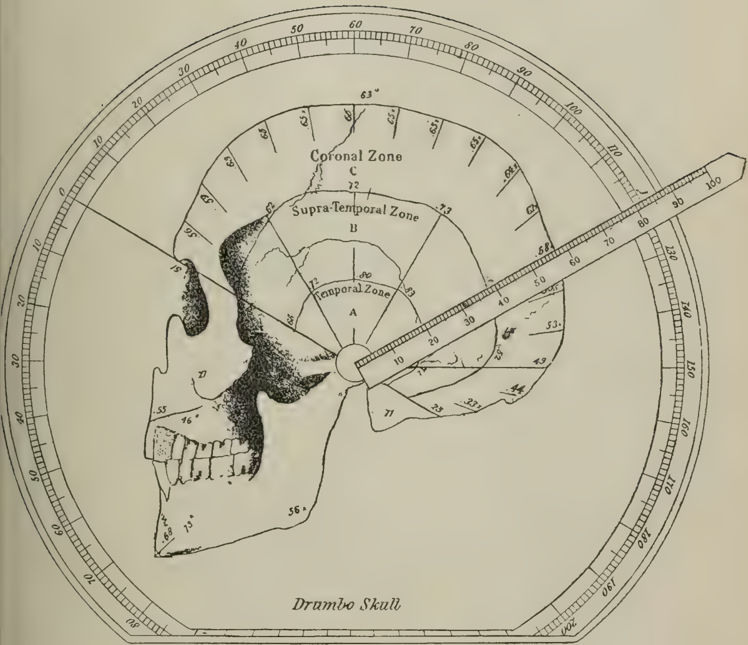

Coronal Zone
C
Supra-Temporal Zone
B
Temporal Zone
A
Drumbo Skull

PLATE II.

another, adopting the same axis as a centre, being indicated upon the graduated circle J by its index K. In this manner mesial measurements, mathematically accurate, both as regards extension and position, may be taken with surprising facility. For the reasons already advanced, however, it has been found to be much preferable to make outline tracings instead, which may be accomplished with very little additional trouble. To do this—replace E in the position it occupies in the diagram ; set A free by removing the pin from R, and then carefully move Q round P as a centre ; keeping, at the same time the tracer W in contact with the skull, and tracing upon the paper Y, with the pencil U, the course the latter takes, which will coincide exactly with the line described by the point of W in its progress ; the position of sutures, and other important points, being indicated as we proceed by short lines perpendicular to the skull. By this means we shall succeed in producing a faithful outline of the entire median section of the skull ; and may, in like manner, produce transverse sectional outlines at any desired point, by simply replacing E in the horizontal position, and by rotating G, bringing the section to be outlined into the same horizontal plane as the point of the tracer W. A series of outlines thus taken (see Plates 2 and 3), affords permanent and unimpeachable materials from which measurements may be taken with perfect accuracy and facility ; and I shall now proceed to explain how the exact dimensions, and the more prominent characteristics of the skill, may be expressed numerically, with the precision and fidelity necessary for scientific purposes.

GRATTAN'S TABLE,

Showing his Scheme of Skull Measurements:—

Section I.

DIMENSIONAL MEASUREMENTS.

Capacity in cubic inches
Length in inches and tenths
Breadth
Vertical height at 60 degrees
Circumference
Occipito-frontal Arch
Transverse Arch at 90 degrees

Capacity in cubic Centimètres
Length in Millimètres
Breadth
Vertical height at 60 degrees
Circumference
Occipito-frontal Arch
Transverse Arch at 90 degrees

Section II.

PROPORTIONAL MEASUREMENTS
in 100ths of Long Diameter of Cranium,
Group I.

Length
Breadth
Vertical height at 60 degrees
Circumference
Occipito frontal Arch
Transverse Arch at 90 degrees

Section II.

MESIAL RADII. Group II.

At Angular Intervals of 10 degrees from the Naso-frontal Suture as Zero, and with the Axis of the Auditory Foramina as Centres.

0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180

To posterior edge of F Magnum
,, anterior do. do.
,, front edge of Upper Maxilla
,, Symphysis Menti

Section II.

CORONAL ARCS. Group III.

Mesial:
Frontal
Parietal
Occipital
Total of, or Occiptio Frontal

Transverse:
At 10 degrees
30 ,,
60 ,,
90 ,,
120 ,,
150 ,,

Section II.

TRANSVERVE DIAMETER, Group IV

Mastoidal
Meatorial

Temporal (A) Zone at
10 degrees
30 ,,
60 ,,
90 ,,
120 ,,
150 ,,

Supra-Temporal (B) Zone at
10 degrees
30 ,,
60 ,,
90 ,,
120 ,,
150 ,,

Section III.

MISCELLANEOUS MEASUREMENTS.

Long Diameter of F. Magnum
Transverse do. do.
Cerebellar Depression below 150°

Angular Position of—
Coronal Suture
Lambdoidal do.
Posterior edge of F. Magnum
Anterior edge of do.
,, Upper Maxilla
Symphysis Menti

1st December, 1903.

PROFESSOR JOHNSON SYMINGTON, M.D., F.R.S., F.R.S.E., PRESIDENT, in the Chair.

SAYINGS, PROVERBS, AND HUMOUR OF ULSTER.

BY PROFESSOR JOHN W. BYERS, M.A., M.D.

(Abstract.)

THE lecturer pointed out how sayings, proverbs, and humour were characteristic of a distinct race, and that a study of these features enabled us to form some opinion of the history and character of the people, to understand their habits and peculiarities, to investigate their methods of speech, and in some measure to explain why they have exerted such an influence in the world's history.

For three hundred years there had existed in Ulster (and mainly the north-eastern part of that province) a race of people who by their power of work, their level-headedness, and thorough self-reliance, have made Belfast the great centre of Irish industries, have contributed to all parts of the British empire men distinguished in commerce, science, literature, statesmanship, and the arts of war; and, as pointed out by President Roosevelt in his great work "The Winning of the West," have done so much in colonising what was formerly called the Western States of America—those lying beyond the Alleghanies.

The Northern Irish are a mixed people, and the Ulsterman from his heredity is a product by himself. Through his veins there courses a stream of Scotch, English, French Huguenot, and Irish blood, and so in the same individual you may sometimes find the pluck and grit of the Englishman, the tenacity and forethought of the Scotch, the industry of the Huguenot, with the keen

sympathy, pugnacity, and ready wit of the native Irishman. The characteristics of a race so constituted find expression in the quaint sayings, proverbs, and humour of the people of the Northern Province of Ireland, which are inspired more by a shrewd observation of men and nature than by mere book-learning. They are met with in their most pronounced form in the country districts as distinguished from the towns, and the clergy and the medical profession who are brought into intimate relationship with the people hear them most frequently.

The explanation of some of these sayings is at times difficult, and, as examples, the following were discussed :—" The rale M'Kay," " A Morgan Rattler," " Tibb's Eve," and " Paying on the Nail." A large variety of other phrases and proverbs having been considered, attention was called to the folk-lore, superstition, and fairy-lore of Ulster, and illustrations were given from the writings of " Moira O'Neill," Allingham, W. S. Drennan, as well as from personal observation.

Various " omens " were mentioned, the " Banshee " was discussed as well as terms and phrases used, indicating the power of observation possessed by the Ulster race.

Finally, reference was made to the " Humour " of the Northern Province of Ireland, which differs from that of the South in not being so apparent and spontaneous, and not so topsy-turvy ; it was of a drier kind, but at the same time could be as sparkling as that met with in any other part of the country. One feature about the Northern humour was that while it is not so much on the surface and in many cases was not so evidently prepared beforehand as is found in the South of Ireland it is not so readily exhausted. In driving through Dublin the jarvey will at once when you mount his vehicle fire off some humourous saying ; in the North of Ireland, the carman, on the contrary, waits until you draw it out of him by some remark, but while the carman in the South shows by the twinkle in his eye that he is amusing you, his Northern confrere never exhibits by any emotional evidence that he is poking fun at you. Examples were given to illustrate the Ulster Humour.

[The lecture of which the above is a very short abstract appeared in the March number (1904), of the "Victoria College Magazine," and has since been published, along with "Ulsterisms," in book form.]

Rev. Professor Todd Martin said he thought they should not separate, whatever was their custom, without tendering their hearty thanks to Professor Byers for that lecture, which no other man in the North of Ireland could have given them. Professor Byers had a full acquaintance with Ulster, and that evening he had brought before them some of the traits of the Ulster people in a wonderfully interesting way. They were under a deep obligation to him for that lecture. He was sorry to see that the distinctive characteristics of the Ulster people seemed to be vanishing. The spread of education was driving out a good deal that was distinctive of the province, and it was a great pity that some of the traits of the people could not be seized upon before they passed away. They had unfortunately not been provided with a picture of the province as other parts of Ireland had been presented. Prefessor Byers, he hoped, was on the way to do something of that kind. He moved the vote of thanks heartily, and hoped it would be heartily supported.

Mr. William Crawford seconded the vote of thanks. The lecture had been extremely interesting in every part, and he had the greatest pleasure in seconding.

The Chairman said the lecture was a singularly appropriate one to a society like theirs. Their Museum contained numerous memorials of the work of the ancient inhabitants of this province, and Professor Byers had brought before them that evening not less interesting points that they ought to preserve and treasure as very interesting historical facts.

The vote of thanks was passed by acclamation.

28th January, 1904.

Professor Johnson Symington, M.D., F.R.S., F.R.S.E., President, in the Chair.

RADIUM.

By John Finnegan, B.A., B.Sc.

(Abstract.)

The meaning of Ionisation was first explained, then the nature of Kathode rays, canal rays and X-rays. Becquerel's discovery that Uranium and its salts are continually emitting rays that affect the photographic plate was discussed.

After the discovery of the uranium radiation only one other chemical element—thorium—was found to possess similar powers. About the close of 1897 Madame Curie began the study of Becquerel rays. She soon found that the emission of rays by the compounds of uranium was strictly proportional to the quantity of metal present, and must be an atomic property of the element uranium and independent of its chemical or physical state.

Uranium is chiefly obtained from pitchblende, a velvety black mineral found in the Erzgebirge and in Cornwall. M. and Madame Curie resolved to investigate the radio-activity of pitchblende, and they discovered that some specimens had a radio-activity four times greater than metallic uranium itself, and they immediately set about separating chemically from pitchblende one substance after another, testing each portion for radio-activity. In this way they discovered that, with the separate bismuth, there

came away a very active substance which they named polonium, and with the barium another intensely active substance, which they called radium.

A third highly radio-active substance was discovered in pitchblende by M. Debierne, and called by him actinium; it accompanies certain bodies of the iron group, and is a near neighbour of thorium. All these radio-active substances occur in pitchblende in absolutely infinitesimal quantities. A ton of the uranium residue —that is the dross of the pitchblende after the uranium is extracted—yields about two or three grains of radium salt. The radiation from radium is extraordinarily intense—it emits constantly all the different rays produced in a vacuum tube—and a specimen of a pure radium is more than one million times as active as an equal weight of uranium. A few centigrams of radium bromide discharge an electroscope four or five metres distant, and one can easily discharge an electroscope through a screen of lead or glass three inches thick. Photographic plates placed near radium are almost instantly fogged. Radium can be used like X-rays for the production of radiographs.

Rutherford, Becquerel, and others have shown that radium radiations comprise three different classes of rays. (1) The "Alpha" rays, formed of material particles, atomic in size, charged positively, thrown off with a velocity about one-tenth that of light, easily absorbed by thin sheets of aluminium foil, or by a few millimetres of air. About 90 per cent. of the discharging effect is due to those rays. They resemble the canal rays of Golstein, but have much greater velocity. According to Rutherford, these resemble closely helium. (2) The "Beta" rays, absolutely analogous to Cathode rays, are swarms of flying corpuscles, strongly active and much more penetrative than the Cathode rays of our tubes, moving with enormous velocities, many as fast as light. (3) The "Gamma" rays, not deflected by a magnet, traversing thick sheets of lead, are generally believed to be etherical pulses of the Rontgen ray type.

Radium radiation has an intense physiological effect, producing

skin sores that heal slowly. M. Curie allowed an impure radium salt for ten hours to rest upon his arm ; immediately a red spot appeared, and a sore was produced that required some months to heal, leaving a very marked scar.

M. and Madame Curie observed that every substance which remains some hours near a radio-active salt becomes itself radio-active, possessing induced radio-activity. Professor Curie found that the zinc, iron, and lead fittings, the air of his laboratory, the clothing of the workers, their very persons, in presence of radium, start into activity, and give out rays capable of affecting a photographic plate and discharging electricity. Sometimes he himself could not enter his laboratory or approach his electrometer for days. It has been found that these substances are continually giving out a kind of gas, and this is called elimination ; the radio-activity is caused by particles from this emanation depositing on the surrounding bodies. We have five disintegration products of radium—(1) a very active substance continually produced called radium X ; (2) the luminous emanations arising from it ; (3) the resulting precipitate of this, also self-luminous ; (4) Cathode rays ; (5) "Alpha" rays, and accompanying these a continuous emission of heat.

Rutherford explains the phenomenon of radio-activity by the theory that radium atoms are disintegrated, producing others of less intrinsic energy.

He supposes that a small number of atoms, perhaps one in one hundred thousand millions, becomes unstable every second, and explodes, a part the "Alpha" particle is violently expelled.

The remainder is the radium exonation. This is also unstable and expels another "Alpha" particle, becoming emanation X, which behaves like a solid.

This again is unstable, disintegrating with production of "Alpha," "Beta," and "Gamma" rays. All these are lost to the original radium, and the loss is continuous, but so small that we cannot detect it by weighing. Radium, then, cannot survive indefinitely, and the wonder is that it has survived so long.

Early last summer Professor Ramsay discovered that the fresh emanation from radium does not show the helium spectrum, but, with its decay, helium is produced in ever-increasing quantities, and if this very important conclusion is confirmed it will verify Rutherford's idea that radium is being constantly transformed into helium, and a proof will exist that a transmutation of the elements is possible. Assuming the truth of these laboratory results, we find ourselves in presence of quite startling phenomena.

No one has hithereto observed the transition from one form of matter to another, although everyone knows that such a transmutation was the dream of the alchemists. In recent times skilful observers have suspected such changes from spectroscopic details of solar and stellar spectra. Some chemists have maintained the evolution of matter on the strength of Mendelejeff's law that the elements form a kind of family or related series, and suspected that the barriers between the members were not impassible. All this was the speculation of the very boldest; but in radio-active substances the process appears going on before our eyes. Radium thorium, and uranium are only extreme cases. Atoms of all sorts are reservoirs of energy, and have no guarantee of absolute durability; and Strutt finds that most ordinary materials are slightly radio-active. If we allow ourselves to use our scientific imagination and to push the electronic theory of the construction of matter to its logical limits we may be witnesses of the spontaneous disintegration of radium, and we commence to doubt the permanent stability of matter. The chemical atom may, in fact, undergo a transformation, but so slowly that if one million atoms escape per second from a gramme the weight would hardly diminish one milligramme in one century. A well-known scientist says:—"This fatal quality of atomic dissociation appears to be universal, and operates whenever we brush a piece of glass with silk; it works in the sunshine and raindrops, in lightning and flame; it prevails in the water fall and stormy sea. Matter is doomed to destruction. Sooner or later it will have dissolved into the formless mist of protyle, and the hour hand of eternity

will have completed one revolution." Of atoms, as of men, it may be said with truth, "Quisque suos patitur manes."

Among the experiments which Mr. Finnegan conducted during his lecture was the discharging of an electrometer by bringing near it a tube containing three-fortieths of a grain of radium, the tube enclosed in a metal match-box, and that again in a wooden box.

The Lord Mayor, in moving a vote of thanks to Mr. Finnegan, said they had to thank that gentleman for an evening which he felt sure they had all enjoyed very much. During the last twenty years there had been from time to time scientific discoveries which had sent a thrill of wonder and admiration through them, and of these none was more admirable and wonderful than the new discovery—radium. The world was to be congratulated that it was a lady who had been the means of making them acquainted to some extent with one of nature's greatest secrets. For the welfare of humanity they hoped that these grand discoveries of modern science would continue.

Mr. John Brown, in seconding, congratulated Mr. Finnegan on the attractive manner in which he had treated his subject. To old chemists like himself it was hard to have some cherished belief shattered, but, though he bowed to some of the more modern scientists on some of the points, he positively declined to accept the dissociation theory, which he took leave to say was all humbug. He did not refer to gases, but to electrolytic dissociation. It was a theory made in Germany, and built upon a most unsubstantial basis. He agreed with the Lord Mayor that they ought to do all honour to the great French woman, Madame Curie, whose work had been so attractively put before them by Mr. Finnegan.

The Chairman, in putting the motion, endorsed all the mover and seconder had said in praise of the lecture, which, however, was given under certain disadvantages owing to the want of equipment in the room. Two names had been specially mentioned that evening—Madame Curie and Professor Rutherford. To the former all honour was due. The latter, as they knew, held a

chair at Montreal, and it was fortunate that he did so, for in no laboratory in Ireland would he have found the equipment necessary for the conduct of his experimental work. He might be regarded as somewhat fanatical on this point, but he must say that it appeared to him a national disgrace to any country not to provide adequate opportunities for research into problems which were of interest to every intelligent man, and which had a practical bearing upon almost every department of work. They knew that many of the discoveries of modern science were already largely employed in medicine, and there was hope that some of them might be of even greater utility to suffering man than they had yet been. They ought, he thought, to all try and do their best to remove what he considered a standing disgrace to the country—the want of proper equipment for scientific research. If all their public men in Belfast were as energetic and active in support of scientific research as their present Lord Mayor, who took the keenest interest in scientific work, especially in physical and electrical research, the reproach would soon be wiped out.

The vote was passed with acclamation.

Mr. Finnegan, in acknowledging it, endorsed what Professor Symington had said about their poor equipment in Belfast. In going about the scientific appliance shops in London he had more than once been shown a splendid scientific apparatus which was going out to Mr. Rutherford at Montreal. It was a standing disgrace that up to the present there was no physical laboratory at the Queen's College, Belfast. However, they had been promised such a laboratory by Mr. Pirrie, and when they obtained it he hoped it would be more perfectly equipped with men as well as good appliances.

17th February, 1904.

Mr. William Swanston, F.G.S., Vice-President, in the Chair.

A HISTORIC TRIAL: THE LIMAVADY GOLD ORNAMENTS CASE,

By R. Lloyd Praeger, B.E., M.R.I.A.

(Abstract.)

Mr. Praeger, in the course of his lecture, pointed out that the Limavady gold ornaments case had been in many respects a most remarkable one. The action had been at the suit of the Crown against the trustees of the British Museum for the delivery up of certain ancient golden Celtic ornaments. The matter had originated through the finding by a ploughman named Nicholl in April, 1896, on a farm near Lough Foyle, of the following articles :—(1) A hollow collar, in two sections, with elaborate repoussé ornamentation of eccentric curves; (2) a model boat, with eight thwarts (originally nine) and a number of oars and spars; a hemispherical bowl of thin metal, with four rings at the edges for suspension; (4) a solid gold torc of stout wire, with a thin wire twisted round it; (5) one half of a similar torc; (6) a necklace, formed of three-plaited chains, with a peculiar fastening; and (7) a thin single chain of same plaiting.

The articles were found some fourteen or fifteen inches below the surface of the earth and packed together within a radius of nine inches, showing that they had been deposited there.

The lecturer proceeded to describe how the ornaments were

exhibited at a meeting of the Society of Antiquaries of London, in January, 1897, when a paper was read about them, and how the British Museum subsequently purchased them for the sum of £600. The Royal Irish Academy took action, claiming that all such articles should be deposited in the national collection, and five years of agitation ensued. The Government agreed to have the question thrashed out in a court of law, and ultimately the action was brought in the name of the Attorney-General on behalf of his Majesty the King, the trial taking place before Mr. Justice Farwell in June of last year.

The evidence for the Crown and for the defence was fully dealt with, and some of the most interesting extracts therefrom were read by the lecturer.

The questions opened up by that portion of the defence which urged that the articles constituted a votive offering made to a deity at a time when the site was still below the sea, were extremely varied and interesting. Witnesses were examined as to the customs pertaining to votive offerings at all times and in all countries, and a court of law heard quotations from Herodotus, Strabo, and Tacitus, and particulars relative to votive offerings found in Danish bogs, or made at the present day in the Malay Peninsula. The theory of votive offerings was also dealt with by the lecturer.

The geological evidence was also interesting. The fluctuations of level of our coasts since the glacial period were fully dealt with, and descriptions given of the post-glacial series at Belfast, Larne, and elsewhere. The evidence of the age of these movements was argued out, in the light of contemporary human remains.

The result of the trial was that the Judge finally made a declaration that the articles were treasure-trove, belonging to his Majesty by virtue of the Prerogative Royal, and accordingly ordered delivery of them. The final scene in connection with the matter was enacted in the rooms of the Royal Irish Academy at their first meeting this session, when the Academy formally received the articles, and they were now in the National Museum in Dublin.

Professor Boas, in moving a vote of thanks to the lecturer, said the lecture had been a most admirable one, and he was sure he spoke for everyone present when he said they had listened to it with intense interest. Indeed, he had not heard anything so interesting of its kind since he heard Mr. Evans in Oxford give an account of his discoveries in Crete. They had all derived added interest from it by the fact that facsimiles of the gold ornaments had been exhibited that night. He (Professor Boas) had not the shadow of a doubt that the proper home for the ornaments was the Museum in Dublin, where there was a marvellous collection of Celtic ornaments.

Mr. Wilson seconded the motion, which was heartily passed.

Mr. Fennell said that facsimiles of the ornaments were now in the possession of the Belfast Corporation, and might be inspected by those who cared to see them in the Free Library.

Mr. Praeger suitably acknowledged the vote of thanks.

22nd March, 1904.

PROFESSOR JOHNSON SYMINGTON, M.D., F.R.S., F.R.S.E., PRESIDENT, in the Chair.

AROUND YOUGHAL AND THE BLACKWATER WITH THE ROYAL SOCIETY OF ANTIQUARIES.

BY SEATON F. MILLIGAN, M.R.I.A., F.R.S.A.I.

MR. MILLIGAN said they were all aware that the Royal Society of Antiquaries of Ireland had stated meetings quarterly, one held in Kilkenny, two in Dublin, and the Summer meeting which went the round of the four Provinces in rotation.

Last year this meeting was held in Munster, and the place selected was Youghal, a very interesting old town. One of the objects of these meetings was to interest the people of the country in preserving antiquities and creating an interest in archæology, which they have done to a very great extent. Their meeting in Youghal was a very enjoyable one, not alone on account of the antiquities, but also on account of the fact that the scenery everywhere was most picturesque. He would attempt to take them in spirit with him to the South of Ireland.

They would first of all go to the city of Cork, and from thence they came to Youghal. On arriving at the terminus and going up the platform, they observed on one side a bay, something like Belfast Lough as it looked from Bangor, but not quite so large, and on their left numerous villas and terraces, usually let as marine residences and lodges for visitors during the summer

months, as Youghal was a well-known and largely-frequented seaside resort in the South. The walk from the station to the town proper, fully half a mile or more, afforded a fine view of the bay, the strand, and the town of Youghal lying on the lower ground.

The town, which was picturesquely situated where the Southern Blackwater emptied into the sea, consists of one street fully a mile or more in length, with some small cross-streets at intervals. It has an ancient history, something like that of their own old town of Carrickfergus, but it went further back into the early period of the ancient Celtic Church. Certainly during the Viking period it was an important place, and had a well-authenticated history through the Anglo-Norman period, as its various ancient charters testified. In a town of such a character they naturally expect to find many relics of the past ages, and in this they were not disappointed. The main street was narrow, and about half-way through they passed underneath an arched gateway, on which was erected a building of four storeys, surmounted by a clock tower. The members were welcomed in the Town Hall by the chairman and members of the urban council, who exhibited their ancient charters and various local curios. They were fortunate in having such an intelligent and well-informed guide as Mr. J. C. Buckley, the honorary local secretary of the Society, who was possessed of vast stores of knowledge on all local subjects, and conveyed it to them in most fluent and eloquent language.

Their first, and part of the second, day was passed in examining the antiquities and places of interest, the most important of which was the Collegiate Church of Saint Mary and the warden's house, commonly called Raleigh's House. Portions of the old town hall and the ruins of the two monasteries, called respectively the North and South Abbeys, were still standing. The North was of the Dominican, and the South of the Franciscan order, and the latter was the first house of the order erected in Ireland in the early part of the 13th century by a member of the Desmond family. The Dominican Friary was also founded by another member of

the same illustrious family, who owned the town of Youghal and surrounding district. There was also in the main street the ruins of an ancient keep called Tynte's Castle, built in the 15th century, and opposite this was a fine specimen of domestic architecture, built between 1706 and 1715—a fine type of Dutch house of that time.

Youghal was noted for the excellent brick made there, and the bricks in this house may have been of local manufacture, though some authorities said they were Dutch. Hayman in his guide stated that the Church of St. Mary at the north end of the town was founded in the 11th century, and no doubt an earlier church existed on the site and was replaced at that period by a church built in the Hiberno-Romanesque or Norman style of architecture. On nearly the same site a new church was erected by Richard Bennett, a knight from Wales, and Ellis Barry, his wife, in 1220. During the rebellion in the year 1579 it was ruined by Gerald, the 16th Earl of Desmond, and lay roofless for a period of 270 years. In the year 1852, the rector, Rev. William Pierce Drew, aided by generous contributions, had the choir roofed and tiled, rescuing it from ruin, but not restoring it to its original beauty. Raleigh's house stood close by St. Mary's Church. It was on record that Sir Walter Raleigh resided here in the years 1588 and 1589, when he was Mayor of the town.

It was from Youghal Edward Spenser embarked when he went to London to publish the first three books of the "Fairie Queen." It was also supposed that the first potatoes planted in Ireland was at Youghal, in the garden attached to Raleigh's house, and also that the first tobacco smoked in Ireland was under the shade of the myrtle trees in the same grounds. The name Youghal was derived from two Celtic words, meaning yew-wood, and certainly the yew seemed indigenous to the place, and grew luxuriantly.

After referring to the industries of Youghal and its history as a trading port, Mr. Milligen proceeded to describe a journey on waggonettes to the interesting places near Youghal. First the Preceptory of Rhincrew, a stronghold of the Knights Templars,

said to have been founded in 1183 by Raymond Le Gros, and the ancient castle called Temple Michael, which was erected by one of the Desmond family in the fourteenth century to protect an important ford on the Blackwater. It was battered by Cromwell during his campaign, and the last of the Fitzgeralds who held it assisted Lord Castlehaven in the year 1645 to cross the ferry that he might bombard Youghal. A little further was the ancient Celtic monastery known as the Abbey of Molana.

Driving to Ardmore, Mr. Usher, who is well known in Belfast as local secretary for County Waterford, became their guide. The beauties and the antiquities of this lovely spot would be very difficult to do justice to. Ardmore was a well patronised watering-place for County Waterford and County Cork, and many families from Cork city came there to enjoy the fine sea bathing and splendid air from the Atlantic. The village was built on the high rocky ground overlooking the bay, and at the foot of the rocks was a sandy shore or strand, where the sea was making inroads. On the occasion of his previous visit they were shown as a great curiosity the remains of a crannoge down on the sea shore. The stakes were there, and no doubt that the sea had encroached to where the crannoge was, which was formerly a bog, and some of the peat or turf still remained.

The Holy Well was situated on the top of the cliff, close to the sea side. They usually found an attendant ready to provide them with a drink at this Holy Well. Close to the cathedral was the round tower, St. Declan's Oratory, and the ogham stones. Great uncertainty exists about the date of the birth of Declan, the founder of the Christian Church at Ardmore. Some placed his birth as early as 347 A.D., which would put him before St. Patrick. Be that as it might, at a very early date St. Declan, who was of Royal descent, founded the first Christian Church here, and his oratory, still remaining, was supposed to be the original church. The reputed burial place of St. Declan was within his little church or oratory at Ardmore. It stood about 70 feet from the cathedral, and measured internally 13 ft. 4 ins. by 8 ft. 9 ins., and the walls

were 2 ft. 5 ins. thick. The ground had risen from the great number of interments, until it was within a foot of the lintel of the west doorway, which was intact.

The round tower was one of the finest in Ireland, and most graceful in shape. It was 95 ft. 4 ins. high, tapering to the top. At the base it was 17 ft. diameter; at the door sill, internal diameter, 9 ft. 1½ ins.; and the walls 3 ft. 5 ins. thick. The internal diameter at the top storey was 4 ft. 7 ins. It had three projecting string courses, and the internal floors had disappeared. The doorway faced east, and was round-headed, and stood 12 ft. 10 ins. high. There were 4 storeys, an opening to the back storey, and four on the top, facing the cardinal points. The records of the cathedral were scanty. It appeared to have been built originally in the Hiberno-Romanesque or Norman style. The transition from Norman to Gothic appeared in the chancel and its pillars, and, lastly, the east window was of late Gothic.

After describing the interior of the cathedral in minute detail, the lecturer said their concluding excursion was a drive to Lismore, and return by steamer in the evening down the Blackwater from Cappoquin. Lismore, like Ardmore, was a very ancient seat of learning and Christianity, going back to early in the sixth century. The name of a bishop who died in the year 588 was given, but St. Carthagh in the first half of the 7th century was more associated with Lismore as the founder of the cathedral and college. Here was an ancient monkish school similar to Bangor in Down, to which scholars came for general education and to learn the principles of the Christian faith.

The Danes, who came up the river from Youghal, plundered and burnt Lismore in 819, and laid waste the whole country. It was burned again in 869, and plundered in 913 by the Danes. Notwithstanding all it passed through in the Viking period, it arose phœnix-like from its ashes and produced many famous men and great scholars. There were no relics of this early period now remaining, if they excepted the Crozier and the ancient M.S., known as the Book of Lismore, found concealed in a receptacle

within a wall of the castle. The crozier was made for a bishop who died in the year 1113.

The only buildings of interest in Lismore were the cathedral and the castle. The cathedral was almost a ruin when Richard Boyle, Earl of Cork, in the year 1633 commenced to restore it. The castle was the most interesting feature in Lismore. Some portions of it were old, but the greater part of it was modern. The site on which it stood was said to have been the monastery of St. Mochuda, and the view from the bay window was one of the finest imaginable.

Having commented on the great beauty of the scenery along the Blackwater, and made some valuable suggestions to intending excursionists to the district, Mr. Milligan concluded by saying the visit of the Society to Youghal was most enjoyable, and they all left feeling the invigorating effect of the fine sea breezes from the Atlantic.

On the motion of Mr. W. H. Patterson, seconded by Mr. Wm. Gray, the best thanks of the meeting were conveyed to Mr. Milligan for his most entertaining and instructive lecture.

26th April, 1904.

MR. WILLIAM SWANSTON, F.G.S., VICE-PRESIDENT, in the Chair.

PRESENTATION TO MR. S. A. STEWART, A.L.S., F.B.S.

THE Presentation was made jointly by the Society and the Belfast Naturalists' Field Club on the occasion of the election of Mr. Stewart as an Associate of the Linnean Society.

The Chairman said there was no one in Belfast, or perhaps in Ireland, who had done so much for natural history in its various departments. He had done a great deal for botany and geology, and also, though it was not generally known, for zoology. He stood at the top of the tree in natural history. He (the Chairman) regretted the absence of the President, which was unavoidable, and hoped that Mr. Stewart would long continue to enjoy the honour that had been conferred on him.

Mr. W. J. Fennell said, as President of the Belfast Naturalists' Field Club, he would like to add, on behalf of their members, an expression of the high esteem and regard in which they, one and all, held their old friend and companion. The address was an official one, but no words could justly express their admiration for a veteran who had made no enemies and retained the fast love of a long roll of friends. For forty years he had worked for and with the club, which he helped to found, and now, at last, he had received a high distinction. He was still the living encyclopedia to whom many of them gladly turned when seeking information, which was always cheerfully given. There were comparatively few men whose records were so quiet and so

brilliant. Mr. Fennell then read a number of extracts from letters received congratulating Mr. Stewart on his well-earned honour. Amongst the writers were Lady Harland, Sir William Quartus Ewart, Bart. D.L.; Miss Hodges, Rev. C. H. Waddell, Messrs. James Davidson, Corry, and others.

The Address was read by the Honorary Secretary—Mr. R. M. Young :—

To SAMUEL ALEXANDER STEWART, A.L.S., F.B.S., Edin.; Curator of the Collections in the Belfast Museum, and Hon. Assoc. Belfast Nat. Hist. and Phil. Soc.

DEAR MR. STEWART,—We the President and Members of the Natural History and Philosophical Society, and the Members of the Belfast Naturalists' Field Club, desire to place on record the high sense of satisfaction with which we have learned that you have been elected an Associate of the Linnean Society, as a recognition of your long and valuable services in botanical research, and we desire to congratulate you most heartily on it. And we trust that you may long be spared to wear your well won honours, and to pursue the studies that have brought you such distinction.

We also request that you will accept this Purse of Sovereigns as a slight token of our friendship and esteem.

We are, dear Sir,
Yours sincerely,

JOHNSON SYMINGTON,
President N.H. and P.S.
ROBERT M. YOUNG,
Hon. Sec. N.H. and P.S.
W. J. FENNELL,
President B.N.F.C.
ROBERT PATTERSON,
NEVIN. H. FOSTER,
Hon. Secs., B.N.F.C.

Belfast, 26th April, 1904.

Mrs. Fennell, amid applause, then presented Mr. Stewart with a purse of sovereigns.

Mr. Stewart, in responding, said it was with feelings of the utmost gratification that he received that complimentary address and its valuable gift. His sense of its value was enhanced by the fact that it came from the officers and members of the two societies which cultivated natural science in Belfast and the North of Ireland. It was a red-letter day for him when he was elected an Associate of the Linnean Society. That the premier natural history association of the country should, without any solicitation on his part, have conferred upon him that distinction came as a surprise, and he could honestly say that it was the most prized of all the honours possible to him. The climax came when the naturalists with whom he had worked so long accorded him the present token of their approbation. He felt that his work had to a great extent now been done. Tate, Robinson, and many others who helped it forward, and who were instrumental in establishing their field club, had gone. They had followed Drummond, Patterson, Templeton, Thompson, and many old-time worthies of the Natural History Society. The associations which they founded, however, remained, and new workers had come and were coming forward. He wished those workers every success, and hoped that in nature studies they would enjoy the same pleasures as had rewarded him.

Mr. John Brown said, he was not a naturalist, but he had for many years been associated with his friend Mr. Stewart in his duties as an official of the Society. He could not allow that occasion to pass without saying that a more sterling man and more careful worker he had never found anywhere.

Mr. Wm. Gray said, he had been associated with Mr. Samuel Stewart since 1863, and could say that that gentleman had maintained the tradition of Belfast for knowledge of zoology, geology, and botany. He was a perfect naturalist, and had always attended to his work with persevering energy, and was in the forefront of anything connected with the literature of botany and the other sciences.

Mr. Joseph Wright also paid a glowing tribute to the merits of Mr. Stewart and the work done by him.

THE NATIONAL EXPENDITURE ON THE MAINTENANCE OF GULLS.

By J. Brown, F.R.S.

(Abstract.)

During most part of last summer I sojourned at a pretty fishing village on our coast where the industry was herrings, the talk was herrings, the very smell was herrings, and when we sailed out of the harbour we were reminded of herrings by the cries of the gulls.

The fishermen said the gulls were playing, but if one knew the views of the baby herrings who were invited to the game, these would probably be comprised in the old saying, "what is play to you is death to us."

The play is thus. The razor-bills and other diving birds with a skill worthy of even a "Bobs" have driven the fry into a little Paardeberg of their own at the surface. The sea has two surfaces, top and bottom. The razor-bill prefers the top for breathing purposes. This suits the gulls admirably, and no quarter is given.

If one stand on the bows of a boat which is rapidly sailed through such a "play" one may see the "ball" of fry a wreathing-writhing semi-solid mass of baby herrings.

Every one of them knows what he is about, and that it is a matter of life or death to him to get as near the centre of the ball as possible. Below the razor-bill awaits him ; above the no less pitiless beak of the gull. Truly "Nature is red in tooth and claw."

Let us now become hypothetical and mathematical.

Supposing each bird ate 200 herring-fry in a day, which, considering the activity of the bird and his opportunity and the smallness of the fry, seems a fair estimate, and as his play-time

lasts for about two months, it makes 12,000 fry every season. Now let us consider that each of these 12,000 baby herrings would become a mature herring if let alone, and that the average price of herrings on the pier is about £1 per 1,000, we see that the keep of each gull for two months costs the nation £12. What he costs for the other ten months of the year I leave to the officials of the Marine Laboratory at Larne to investigate.

In making this estimate, I would point out that in fishing the product of the business does not, as in the making of shirts and shoes, depend solely on the capital and labour expended. It is chiefly dependent on the available fish in the sea, since the expenditure involved is practically the same, whether the night's take be large or small.

In a paper recently read before the Belfast Natural History and Philosophical Society by Professor Gregg Wilson, the question was asked "Could men over fish the seas?" and, in reply, the learned author said :—Professor Huxley had been of opinion that this was impossible, and that the damage done by man was infinitesimal compared with what was done by other enemies. It was the last straw that broke the camel's back, and if they put on that last straw it made all the difference, and he thought man could play the part of the last straw." Would it not be better to remove the larger part of the whole load, and let man keep, not only his one straw, but more in addition?

Let us consider the amount of the load that might be removed. At a low estimate there might be 100 birds in each play such as I have described, and say 5 plays per mile of coast and taking the coasts of the three kingdoms and adjacent islands, omitting the smaller inlets, as 4,000 miles, we get a total of 2,000,000 birds whose keep for two months in herrings alone would amount to the grand total of £24,000,000 sterling. When magpies and hawks feed on game in the egg or bird, when rats eat the farmer's corn, or mice the housewife's cheese, they are called vermin and destroyed. But when seabirds devour £24,000,000 worth of

herrings annually Parliament enacts a law to preserve these seabirds.

In the good old times there was, I believe, a reward of so much each for wolves' heads, and there are now no wolves in these countries. We could hardly hope to extirpate these wolves of the sea, but if the State were to offer $\frac{1}{2}$d. per head, thereby saving £12 worth of herring for each $\frac{1}{2}$d. expended, their numbers might at least be reduced. The shooting of seabirds at $\frac{1}{2}$d each would be a profitable industry, since when crowded in a play a dozen or so might fall to one shot, but even a penny would not be thrown away in purchasing 12,000 herrings.

As to the distribution of the reward, I would suggest that the coastguards have a good deal of spare time on their hands.

Finally, it might not be amiss to add that, as I have been credibly informed, some of these seabirds were quite good eating.

People to whom I had given some hint of the above propositions told me I was a heartless wretch to propose the destruction of the graceful and beautiful seagull. I quite appreciate his grace and beauty, just as I appreciate the glistening gracefulness of the snake or the striped beauty of the tiger, but there were excellent reasons of another kind why I do not encourage those animals on my premises or try to preserve them, as Parliament preserves the gulls about the domain over which it rules.

Professor Gregg Wilson cordially agreed with Mr. Brown that it was far better to destroy the enemies of the food fishes than to limit man in his working; far better to kill a hundred gannets than to starve a few fishermen's families. But it was a very complicated question. If the herrings were allowed to grow unchecked the sea would not be able to contain them, and though he would prefer that the herrings should be eaten by useful fishes rather than gulls, still the gulls did not do so much damage as might appear at first sight. The fuller study of fisheries we had, he thought, the better.

Mr. Wm. Gray said the author of the paper had overlooked one

important thing, the utility of gulls' wings, &c., for decorations. He thought the gulls were useful in thinning the multiplication of the herrings, and they should be very careful before they sought their wholesale destruction lest they should injure their fisheries.

Mr. Hamilton said that many seabirds when properly prepared were quite eatable.

Professor FitzGerald pointed out that while no doubt seabirds had fed on herrings for thousands of years and thereby kept a certain balance, in more recent times man had begun to fish also thus disturbing the balance. In order to restore it he presumed some birds would have to be sacrificed.

Mr. W. J. Fennell said by a rather peculiar coincidence he had received a letter that day from an American who had recently paid a visit to Belfast and Portrush, and who wrote protesting against the destruction of gulls.

Mr. Brown in reply, said he felt gratified that the criticism was on the whole favourable, and mentioned that since the paper was written he had observed that the Royal Commission of 1879, appointed to enquire into the Herring Fisheries of Scotland, consisting of Frank Buckland, Spencer Walpole, and Archibald Young, recommended the repeal of the Seabirds Preservation Act so far as it applied to Scotland.

Note added October, 1904.

In the title of this paper it would have been more correct to have put "Seabirds" for "Gulls" since the paper really deals with various kinds of birds.

The numerous notices of the paper published in the press of the United Kingdom would indicate that it dealt with a subject of considerable interest. An article on the subject, revised and enlarged, was prepared for the *Manchester Guardian* of August 8th.

Criticisms for and against were about equally divided. Amongst the latter it was urged that the birds were beautiful, useful as scavengers, and that destroying them was cruel, that if herrings

were left unchecked they would multiply till the sea would not contain them, and that the quantity of fry destroyed by birds was exaggerated. The Hon. Secretary of the Society for the Protection of Birds, London, stated also that the cries of the gulls warned the fishermen of hidden rocks and shoals, and quotes some lines in illustration of this idea. It is a pretty poetic fancy, but if the fisherman fled from every collection of screaming birds, he would have a busy time.

It is possible that before the era of lighthouses and steam fog-horns the cries of seabirds may have been a feeble substitute on cliffs on which they were known to breed.

The weakness of these arguments indicates the scarcity of real support for the other side. The amount of scavenging is probably relatively unimportant.

The true objection is doubtless of a sentimental kind, partly based on a feeling that the destruction of seabirds would involve open cruelty. A correspondent of *Truth* points out that this could be obviated by collecting the eggs for consumption as human food.

The author of that trite and obvious statement about unchecked herrings might have chosen a more prolific species, since according to Buckland, the herring has, weight for weight, only one-third the number of eggs of the average of other food fishes, or taking individual fishes, the turbot has 300 times as many. At present navigation is not impeded by any approach to the "stiffening of the sea" by either herrings or turbot.

On the question of exaggeration it is possible that the number of plays per mile may have been overestimated. On the other hand I have not included the fry consumed by the grampus which swallows the whole ball of fry at one gulp, a feat which he can only accomplish after the divers have collected the fry into a ball. Indeed the divers are the chief culprits since they not only consume but also collect for both gulls and grampus, and if a compromise must be made, let us sacrifice them and keep the gulls, if the sentimentalists insist. The question as to whether fish assist in this rounding up of the fry is a difficult one. I have never observed that they do.

In addition there are the depredations of the gannet and the cormorant which devour mature fish. The former will even take the herrings out of the nets as these are being hauled and the fishermen complain, not so much of what they eat, but of what they shake out and lose.

Mr. Herewald Wake, writing to the *Morning Post*, states that for the most part gulls live on crustacea and mollusca, etc., found on mud flats. These, he states, prey on ova and embryos of our food fishes which would almost be extirpated if the mollusca, etc., were not kept in check by the gulls. Mr. Wake appears to base his remark on the old and obsolete theory that fish came into shallow water to spawn. It is now well known that practically all food fishes are known to spawn in the open sea and nearly all kinds of spawn float on the surface, and there appears to be no evidence that ova or embryos are found on mud flats. Moreover, several species of molluscs devoured by the gulls are useful for bait.

As an argument somewhat stronger than any of the above, it was pointed out that if the supply increased the price would fall. But we have to consider that herrings are cured and exported and that the world's population is increasing, and that by better means of transit new markets are opened. Again on the other hand, if catching herrings were easier, less hands and gear would suffice, and so the cost of production be lessened.

It is also stated that gulls devour the eggs of other sea-fowl thus helping toward reducing their numbers.

Several of my critics say that even if the fry escaped the birds they would be snapped up by other fish. The cod, mackerel, gurnet, pollack, etc., being food fishes, may be perhaps forgiven—the dog fish not so easily.

At all events, if the herring has so many enemies the more he needs protection, and as his allies we can best begin with those most easily got at—the birds.

Among the many critics who agreed with my view I may mention Mr. Matthias Dunn of Megavissey, who is evidently well informed on the question of fisheries. Writing in the *Western Morning News* Mr. Dunn takes a view like that of Professor FitzGerald, and points out that a century ago our fisheries were primitive and local, but in the last twentyfour years alone, since the introduction of steam and of cotton nets they have doubled in capacity. As a natural result of this disturbing of the balance the fish are diminishing in numbers, whole areas of the sea are denuded of them, and the fishermen forced gradually to fish farther off, as far north as Iceland, and as far south as Africa.

On the other hand, Mr. Dunn says since the introduction of the close season the birds are increasing. In the interests of mankind they and their associates should be diminished.

Writing to *The Field* Mr. J. Harvie Brown states that certain species of gull, if not all, are far too numerous not only on account of the fish they destroy but other birds eggs and young.

In a correspondence in *The Scotsman* the interest drifts also into the increase of gulls on the upper reaches of rivers and the destruction of trout and salmon fry there and of the young of wild duck and grouse. Four correspondents describe reliable evidence of this and four others express doubts since they have not seen it.

I am informed that the Irish Fishery Board gives already 1/- each for cormorant's heads to save fresh water fish.

It is at all events well to see the subject so widely discussed from many points of view.

J. B.

BLINKING OR ILL-WISHING.

By E. J. M'Kean, B.A. (Oxon.)

The belief in the evil eye is very old and we meet it in diverse forms in Saga and Folktale. Medusa's glance in the well-known Greek story and Balor Beimenach's destructive glare in Irish myth are but instances of it. It is still dreaded, in Italy especially, and in all countries of the world besides. The evil eye is not always destructive: it may be used to divert to its owner things which should have gone to another, and in this it usually is aided by magic ceremonies. This is the form which it generally takes in North-West Europe and which is usually found in Ulster and of this my paper is to treat.

This kind of charming is perhaps the most important department of witchcraft and is possibly the oldest. It involves ideas which belong to an early stage of the human mind. It is simple, another point in favour of its antiquity, and it requires no extraneous aid. The 'blinker' as we call him in Ulster, can act without the help of ghost or devil.

All witchcraft depends on the idea that some men can of their own will alter the courses of nature by dread powers not given to all, and this idea, which long survived the advent of Christianity, fell finally not by persecution but by the fuller knowledge of the universe which science gave. Like drove out like: the new knowledge broke down the older theory of the world.

The English statute against witchcraft was repealed in 1736, and the last condemnation for witchcraft in Ireland took place at Carrickfergus in 1711, yet we still have in our midst a wide-spread belief in 'blinking' and not a few blinkers. The blinker seldom attacks persons but usually seeks to satisfy malice and interest by blinking cattle and "taking the good" of milk or crops. But nowadays the art is degenerating, its outlines are growing dim, and we have to compare what we learn of it with

the lore of earlier days, of other nations, or of barbarians and savages, to know fully its meaning.

The blinker may be either a man or a woman and I have not found how he gets his power. Some say he serves an apprenticeship. I have never found any certain way of recognising a blinker. Position is, I regret to say, no security, for in one parish in Co. Tyrone both the collectors in church are blinkers. Undue prosperity is ground for suspicion and it is well to bless the churn and take a 'brash' at it if you happen on butter-making in a house. It is suspicious to smoke when churning is proceeding or to ask a piece of turf out of the fire on such occasions or even to be about if you already have the repute of a 'blinker.' A blinker has power to become a hare at times and this belief is very old and widespread for it is akin to the changes of the werewolf and such like men-beasts and to our enchanted white cats and fox-princes of the nursery stories. Sometimes the blinker uses his powers involuntarily and then we have the evil eye in its simplest and most unmixed form and sometimes it is beyond the will of the owner. So a pedlar assured me that once he saw healthy cattle yield not a drop of blood when bled previous to going to grass, as was the old custom, and this because a blinker was present.

Yet though such is his power to hurt he must generally use some ceremony to get control over his neighbour's kine and their produce. Sometimes he goes to skim the dew of his neighbour's grass, especially on May morning, that day so marked in the Celtic calender when many uncanny things are active. Sometimes he skims the froth off the stream from which the cows drink. Sometimes he takes hairs from the tails of the neighbour's cows and twists them into a rope which he trails over the dewy grass in a neighbour's field. So it is unlucky to lend a blinker anything, especially a piggin or a churnstaff.

All these instances have one thing in common: the blinker wants to establish a connection with his victim, but he is satisfied if he gets something associated in idea with it, and this is the root-fallacy in all witchcraft whether the ill-wisher assaults by the

methods above-mentioned or by images of clay or wax or by burning a lock of hair belonging to his victim.

When the spell is done and the cattle are blinked they are distressed and ill and yield no milk, or if they remain healthy and yield milk, no butter comes in the churn. Then either proceed of your own knowledge to cure them or consult a wise man who will probably give you one of two kinds of cure or perhaps both. The first is to watch the suspected person till you are sure of his guilt and then to get him into your house and secretly to cut off a piece of his clothing which is burnt before the cattle. This ends the spell. The blinker is conscious of the burning and will rush out of the house when it takes place.

What has happened is this:—the blinker has something associated with you through which he hurts you: you then get something of his and hurt him through it and you are quits, or it may be you gave his victims strength of the blinker's to make up for their strength taken away.

There is another counterspell which I have not yet met in Ulster but which is so common elsewhere as to deserve mention. The blinker is connected with the milk; well and good! the milk is in connection with him and he shall know it. So take some of the milk and boil it and, if you will, put pins and needles therein. Then he will come bawling to your door and you may make your own terms, for the boiling milk and the pins are causing him most awful agonies. If the cattle yield no milk or have died; burn them or parts of them, and you will easily find and punish the ill-wisher, as is shown in Patrick Kennedy's "Legendary Fictions of the Irish Celts," page 135, and in Rhy's "Celtic Folklore," vol. I., page 304.

The other Ulster cure probably did not once apply to witchcraft but has come from folk-medicine. It consists in transferring the spell from the cattle to a bottle and then burying or hiding the bottle, in one case under a fairy thorn, in another in the suspected blinker's field. Now to get rid of a disease by transferring it to someone or something else is well-known in early medicine, but I never heard of such an idea in witchcraft.

We have many charms against the blinker:—A stallion's shoe, of the meaning of which there is much doubt. Iron is ever a mystic metal, ghosts and fairies may not face it, some say because they are of the Stone Age, but the insistence on the stallion seems to point to more and we may not forget that some races have held the horse sacred. A he-ass is a sure defence, as is a four-leaved shamrock, a holed stone, or in some cases an arrow head of black flint. It is well to milk a heifer at her first milking into a can with a sixpence in it, and it is wise in shooting at a witch-hare to use a silver bullet. Salt is a good counter-charm.

Witchcraft is no new thing and was once in high honour, for in "Irish Magic in the Days of Cormac," an article in the "Dublin Penny Journal," we read that Cormac had invaded Munster and "at last the Druids got new orders from Cormac, and they flung a baleful Druidical breath on the horses, and asses, and cows, and sheep, and goats of Leath Mocha, and their milk was stayed, and nothing was heard through the land but the neighing, and lowing, and braying, and bleating, and sneezing of the cattle." So that blinking is no new thing, and our examination of present day Ulster has thrown light on the Ulster of the distant past when the blinker was a friend of Kings, before Christianity put him under its ban as a servant of the old gods, later identified with the devil.

Yet before we laugh at antiquity for its folly let us look to ourselves. I have heard that one fashionable spiritualist in England, firmly credited by my informant, requires all who would know their future to hold a crystal long in their hands till it is warm and some of their "life-fluid," as she says, has entered it so enabling her to see the inquirer's future in it. Now this is nothing but our old friend the fallacy that Association in Idea is Connection, only that the old hag wears a Worth gown and charges a guinea a séance, which makes a great difference to some people.

REPORT OF DELEGATE TO CORRESPONDING SOCIETIES' CONFERENCE, BRITISH ASSOCIATION MEETING, 1903.

By Professor Gregg Wilson, M.A., PhD., D.Sc., M.R.I.A.

(Abstract.)

I was present as representative of the Belfast Natural History and Philosophical Society, at the First Conference of Delegates of the Societies corresponding with the British Association, on September 10th, 1903. The chief business of that meeting was to hear the President of the Association, Sir Norman Lockyer, and to discuss his proposal for the organisation of scientific workers. Sir Norman advocated the formation of a kind of Guild of Science, whose function should be to promote in every way scientific training. He pointed out that other countries were ahead of us in applying science to industry; that there was urgent need that the claims of science should be pressed upon our government, as many of the responsible authorities knew little, and cared less about science, so that it was necessary to bring home to these the fact that it is the duty of a State to organise its forces as carefully for peace as for war; that Universities and other teaching centres are as important as battleships or big batallions, are, in fact, essential parts of a modern State's machinery.

Sir Norman suggested that the Corresponding Societies working in connection with the British Association might play a great part in infusing a scientific spirit into county councils, town councils, and district councils, and might even control votes in the House of Commons. The future British Association he pictured as a kind of Parliament of Science, dealing with all matters great or small relating to Science.

The discussion that followed was not altogether to the point, but sundry interesting facts were elicited. Principal Griffiths maintained

that what we have to do is to educate the man in the street, and convince him that pure science is a good thing for him. The Principal did not seem to think that we could hope to get at the government till the masses were converted. Another speaker advocated commencing with the "boy in the street," and others dealt with their success or their difficulties in working this lowest stratum, rather than with Sir Norman's proposal to force the government to give more help.

Mr. Munn Rankin afterwards read a valuable paper on "The Methods and Results of a Botanical Survey of Counties." He called attention to the great interest of plant-groupings or associations, and showed how new life may be put into the study of systematic Botany by the consideration of plants in relation to their neighbours and their environment. He called upon Natural History Societies throughout the country to do their part in mapping out the areas of the various well-marked associations.

I strongly recommend consideration of this subject to Belfast botanists, and may mention that Mr. Praeger has already taken up the mapping of a district near Dublin in the way suggested.

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Report and Proceedings

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Shares in the Museum cost £7 each. A holder of one Share pays an annual contribution of ten shillings ; a holder of two Shares (in one certificate) an annual contribution of five shillings ; while a holder of three or more Shares (in one certificate) is exempt from annual payments. Shares on which the annual payment as above are in arrear are liable to forfeiture. The Council retain the right to decline to consolidate two or more share certificates into one certificate.

Annual Subscribers (Associates) pay £1 1s. (one guinea) due 1st November in each year in advance.

A General Meeting of Shareholders in the Museum is held annually in May or June, or as soon thereafter as convenient, to receive the Report of the Council and the Statement of Accounts for the preceding year, to elect members of Council to replace those retiring by rotation or from other reasons, and to transact any other business incidental to an annual meeting. Shareholders only are eligible for election on the Council.

The Council elect, from among their own number, a President and other officers of the Society.

Each Member has the right of personal attendance at the ordinary lectures of the Society, and has the privilege of introducing two friends for admission to such ; and he has also the right of access to the Museum and Library for himself and family residing under his roof, with the privilege of granting admission orders for inspecting the collections in the Museum to any person not residing in Belfast or within five miles thereof. The session for lectures extends from November till May.

The Museum, College Square North, is open daily for the admisson of visitors, for such hours as the Councll may from time to time decide ; the charge for admission to non-members is sixpence each. The Curator is in constant attendance, and will take charge of any donation kindly presented to the Museum or Library.

Any further information required may be obtained from the Honorary Secretary.

THE NEW MUNICIPAL TECHNICAL INSTITUTE, BELFAST.
(NOW IN COURSE OF ERECTION.)

BELFAST

NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

SESSION 1904-1905.

22nd November, 1904.

PROFESSOR JOHNSON SYMINGTON, M.D., F.R.S., F.R.S.E., in the chair.

TECHNICAL INSTRUCTION IN BELFAST: A RETROSPECT AND A PROSPECT.

By FRAS. C. FORTH, Assoc. R.C.Sc.I., Principal of the Municipal Technical Institute.

(Abstract.)

MR. FORTH began his Address with a short review of the paper he had read before the Society in December, 1901, entitled, "The Municipal Technical Institute: its Aims and Aspirations," touching upon the leading points then discussed, and comparing the work then projected with that which had since been accomplished.

Referring to the class entries for the First Session as compared with the current Session, it was stated that whereas at the end of the tenth week in the First Session the class entries totalled some 3,000, at the end of the tenth week in the present (the Fourth) Session, the class entries totalled over 6,000 (the actual figures being 6,180). The number of students enrolled has proportionately increased, the number now being 4,555, with 103 in the Day (or Trade Preparatory) School; making a total of 4,658 individuals.

With regard to the efficiency of the work of the students it was stated that during the past three years a marked increase had been observed in power of application, in regularity of attendance, and in the interest shown in study; but that comparing the students of the present with those of three years ago, no perceptible improvement was noticeable in regard to the educational preparedness of students taking up science and technical studies.

The evening preparatory classes conducted by the Library and Technical Instruction Committee in the Branch Schools are attended by an earnest body of students, and quite a number of these young people are coming forward to the higher departments in order to study science, technology, or art. The imperfection of training makes itself markedly felt, and to this may be traced a distinct percentage of that falling off in attendance which occurs as the session progresses, more especially in the elementary classes.

Teaching Staff.

A factor which has contributed in a marked degree to the development and uplifting of the Institute's work was the appointment of responsible Heads of Departments. The plan had been followed that as the Institute progressed, and as a Department could fully employ a head teacher, to make the appointment. In this way the chief positions in art, in chemistry, in physics, and in mathematics have been filled; and quite recently a Head of the Textile Department and a Head of the Mechanical Engineering Department have been appointed. The Department of Naval Architecture is not yet provided for; but in view of the immense local importance of the shipbuilding industry it is hoped that the development of the Naval Architecture section of the Institute's work will soon be on so satisfactory a scale as to warrant the appointment of an expert teacher for this section also.

The next point touched upon was the Trade Preparatory Day School, intended for boys who have passed through the curriculum of a national school, and who are intended to enter

into industrial occupations. In referring to this the lecturer said he felt on dangerous ground, for possibly no branch of the Technical Instruction Committee's efforts had been more debated and more strenuously opposed than this one, mainly for reasons which it might be said after two years' experience, had been shown to be almost entirely without foundation. Continuing, the lecturer said it was worth devoting a few moments to examining the motives which actuated the Technical Instruction Committee to embark upon this portion of their work. In planning their earlier programme the Committee had recognised that of the 62,000 children on the rolls of National Schools a proportion of boys leave school every year, having no opportunity under the then existing conditions of obtaining a higher education. Of this number a certain proportion must unquestionably enter upon some one or other of the industrial occupations carried on in Belfast and neighbourhood, and the problem was how to provide educational facilities for such boys. The Department of Agriculture and Technical Instruction, as part of its experimental science programme, had arranged a course of instruction in mechanical science, and this course supplied the solution, and enabled the Committee to provide a grade of education not already available. The Trade Preparatory School of the Municipal Technical Institute was accordingly established. Last year some seventy-nine pupils passed through the First Year's course, and this year one hundred and three pupils are entered in the books—fifty-two in the first year and fifty-one in the second year. These boys, after completing their studies, should be found exceptionally useful in industrial establishments, as their training is being made as practical as possible, consistent with due attention being paid to the broader subjects of a general education. It is anticipated that later on these boys will become students of the evening division, and it is hoped to find them carrying their studies further, and incidentally raising the whole standard of the work in the evening classes.

It was stated that at the time of the establishment of the Trade

Preparatory School great fear was expressed by those interested in Secondary Schools that the new School would act detrimentally upon existing Secondary Schools; but the question having been looked into with an earnest desire to arrive at the bare facts, it could not be discovered that such injury had resulted, and it was asserted that the fear was rather that it would not be possible within a reasonable time to make up the leeway and fill up the educational gaps which abounded. The view was also given that the Trade Preparatory School, instead of acting detrimentally, is having the very reverse effect, for there are not wanting signs that it has had the effect of stimulating to greater efforts more than one local Educational Institution.

Passing on to the effect of the Technical Instruction Committee's efforts on the life of the city, it was stated that a distinctly increased appreciation was being attached to education in all its phases; as evidence of this it was pointed out that an increasing number of employers are sending their employes to attend classes of the Institute, and are paying the fees, offering prizes, and in other ways encouraging those who have been sent to the School. This interest is shown not only by employers, but is found equally amongst the artizan population, some of the trades societies having gone the length of devoting a portion of their funds to provide prizes to encourage members of their trade to avail themselves of the instruction provided in the Institute. The keenness of the students to secure tangible evidence of their progress is also most noteworthy. The certificates won are greatly valued and the class prizes eagerly sought after. As independent evidence bearing upon these statements and testifying to the general increase of interest in education, the following letters were read. One from Sir William Quartus Ewart as follows:—

Glenmachan, Strandtown, Belfast.

November 19th, 1904.

Dear Mr. Forth,—I am sorry that I cannot be present at your lecture on Tuesday evening. Very few who see the fine

WOODWORKING SHOP--TRADE PREPARATORY SCHOOL.

building rising in College Square for technical instruction in Belfast can realise the change that has come over the spirit of the people. For many years a few townsmen—perhaps ten or twelve—who were in earnest on the subject, held their little meetings and gathered in small subscriptions, often with difficulty; they held an annual meeting in the Ulster Minor Hall or other such place, in general thinly attended, and often the little effort was in danger of not surviving for another year. But that small band of men, though disheartened, held on tenaciously. There was the late Sir James Musgrave, Professor Fitzgerald, Mr. R. H. Reade, Mr. John Malone, Mr. H. J. Nicholson, Mr. Loewenthal, Sir James Henderson, Dr. Kyle Knox. There were others equally faithful, whose names do not occur to me at this moment; and my reason for writing this letter at all is to bring forward the fact of how much those who will benefit by the new great School owe to those gentlemen for their foresight and self-denying perseverance.—Believe me, yours very truly,

(signed) WM. Q. EWART.

Another letter was from the Secretary of the Sheet Metal Workers' and Gas Fitters' Union. This letter, after giving information bearing upon the needs of their members in regard to technical education, continued:—"I might also add that the members of above Union have agreed to voluntarily subscribe towards providing a prize for the most successful apprentice."

Referring next to the accommodation provided by the Library and Technical Instruction Committee, a number of lantern views were shown illustrating the extensions and developments which have been planned in connection with the new building in order to keep pace with the growth of the number of students attending the Institute. Particulars were given of the building as first planned by the architect, Mr. Stevenson, in 1900, and these were supplemented with various details in regard to area, &c. It was then shown how in 1901 these plans were found inadequate, and a first extension took place. Another extension was made later, and it was decided to build across the central well and to

construct a central hall. Finally, within the past eighteen months, after considerable consideration and examination of the whole subject, the erection of a fifth storey has been decided upon and sanctioned by the Corporation. The total net floor area of rooms as now provided for is 109,000 superficial feet, the gross floor area being 134,000 superficial feet. The total cost of the structure, as now planned, will be about £100,000, exclusive of equipment, furnishing, and lighting. The Committee is making provision for the expenditure upon these additional items.

(Here a number of slides were shown of the site as it stood originally, and also of the different plans prepared for the building, including the present or final scheme.)

With regard to the financial position, it was explained that the Corporation levy a penny rate for technical instruction, and that this rate produces about £4,500 per annum, On condition that this rate is levied, the Department of Agriculture and Technical Instruction make a payment which amounts in the case of Belfast, in round figures, to £11,000 per annum. Added to this there are other sources of income such as fees, science and art grants, interest on sums invested, bringing the total income of the Committee to close upon £20,000 per annum.

It was pointed out that, for each penny raised by the rate, about three pence is received from other sources.

In concluding, reference was made to the day technical department which it is hoped to establish, and also to the development of instruction for apprentices in engineering and other industries.

Mr. J. M. Finnegan proposed a vote of thanks to Mr. Forth for his able and interesting lecture. He said he fully appreciated Mr. Forth's difficulty in regard to the want of preparation on the part of students. Looking back to the time when he was in a national school, he could not find in the higher class of schools at present the same amount of thoroughly good work that used to be done. In many a country national school a boy used to be turned out who had a very good knowledge of algebra, arithmetic, and mensuration. He was afraid in that direction they had gone

behind. He had often thought how long must they wait until Belfast got a decent system of national education.

Mr. W. Swanston seconded the resolution.

Mr. Mann Harbison said, at the meeting of the British Association in Belfast, two years ago, they heard a great deal about the co-ordination of education, but they had seen nothing of it yet. With regard to students being properly prepared for entering the Technical Institute, he believed that was quite practicable if it were set about in the proper way. The National Board should look after the matter through their Inspectors, and see that a class of boys in every school was properly prepared in the programme that would be necessary. They might also have co-ordination at the top as well as at the bottom ; and if diplomas were given to the technical students, perhaps the Universities might accept from these students one examination, in order to obtain the B.Sc. degree.

Mr. D. B. Elliott said it was admitted that the national system of education was very far from perfect. There was overlapping of Boards, and until the whole system, or series of systems, were swept away, and some national system introduced, they would never have proper education in Ireland. Primary education was most in need of reform. Mr. Forth had justly complained of the want of preparation, but that was not the fault of the teachers. It was the fault of the system.

Mr. William Gray spoke of the necessity of correlation, and advocated the desirability of correlating the Municipal Library, Art Gallery, and Museum, and also the Elementary or National Schools with the other educational agencies embraced by the Municipal Educational Scheme, the ultimate success of which must depend very much upon the efficiency of the Elementary Schools, as the stability of a superstruction depends upon the efficiency of its foundation.

Mr. F. Curley said the success which had attended technical education under the Belfast Corporation was largely due to the course Mr. Forth had pursued from the time he was appointed Principal.

Mr. S. F. Milligan briefly alluded to the efforts made on behalf of technical education before the introduction of the municipal scheme, and said that many more names could be added to Sir William Q. Ewart's list, including that of Mr. William Gray. He also pointed to the warm interest taken in the subject by Sir James Henderson.

Mr. Horner said the work done by the late Sir James Musgrave and others in the old technical school should not be forgotten. As to primary education, unless something was done to free the primary schools from all sectarian control, Mr. Forth could not possibly get into his Institute the class of scholars that he wanted.

Dr. Sheldon made some remarks regarding the correlation of primary with secondary schools. Referring to the Trade Preparatory School, as a ratepayer he objected to maintenance scholarships being provided for other than the clever children of indigent parents. He did not think public money should be provided to keep the child of a man whose salary was, perhaps, much higher than that of the people who paid rates. Maintenance scholarships ought to be given only in cases where the father's salary was decidedly low and the child's talents decidedly high. From personal knowledge he could say that the training given in the Municipal School of Art was highly satisfactory.

The Chairman said, before calling upon Mr. Forth to reply, he would like to refer very briefly to one or two points which had been raised in that discussion. In the first place he certainly thought they ought to congratulate Principal Forth very cordially on the great success which had attended his work in Belfast, and he (Professor Symington) thought that success had been well deserved. Mr. Forth had certainly worked very hard to instil into the minds of a somewhat apathetic public the importance of technical education, and if that Institute did not ultimately turn out a great success, it certainly would not be the fault of Mr. Forth. He was very pleased to hear from Mr. Forth that he attached very great importance, not merely to having a very fine

building, but also to having that building properly manned. That was a point on which, he thought, they ought to express themselves in very decided terms, as they knew from the daily papers that objections were made to the supposed high salaries to be given to the heads of departments connected with that Institute. He (the speaker) happened to have had some experience of various Universities in various countries, and he must say everyone who had had experience knew that it was the brains that were required very much more than bricks and mortar. He could point to very finely-housed Institutions which were producing practically nothing on account of the fact that the heads of the departments were not the right kind of men ; and he could point to Institutions where the buildings were utterly inadequate for the purpose for which they were designed, but which, through the ability of the men conducting these departments, were of world-wide repute. If the Belfast Institute was to be a success it must be properly manned, and they would not get good men unless they paid for them. It was also necessary that they should not overburden the teachers with work. He trusted time would be allowed to the heads of departments to do some original work. If the Institution was to merely extend knowledge already gained, and had nothing to do with the acquisition of new facts and the evolution of new theories, it would fail in an extremely important function. In conclusion, he would convey to Mr. Forth the thanks of that Society for his extremely interesting lecture.

Mr. Forth, in replying, said he was especially pleased at the very healthy and vigorous discussion which had taken place. He held that the educational question was of such a character that they would only arrive at practical results by free and full discussion. In reply to Mr. Harbison's suggestion, they hoped to issue a certificate that would have a very definite value to students. In conclusion, he thanked them very much for their expression of opinion on his lecture.

20th December, 1904.

Professor Johnson Symington, M.D., F.R.S., F.R.S.E., President, in the chair.

STAINED GLASS.

By James Taylor.

(Abstract.)

This curious and beautiful Art was so long relegated to a position of obscurity and neglect that it may be said to have altogether ceased to exist. In Oxford itself it had so far ceased to interest even Antiquarians that until a few years ago the many beautiful examples of medieval glass in that venerable City had never been so much as catalogued. The modern Revival of Stained Glass as a fine art dates back to the beginning of the XIX. century, the same movement which reawakened interest in Gothic Architecture leading to a corresponding interest in what was supposed to be Gothic Glass. At that time, however, glass was merely welcomed as a helpful accessory in an Ecclesiastical Revival, no idea of developing its use for the legitimate expression of artistic feeling having entered the heads of the Revivalists. The glass worker was neither asked nor expected to utilise whatever talent he may have possessed in his particular craft—the demand was simply for windows which were supposed to resemble those of the XIII. century. That was the first great misfortune which befel the Art; but it was not very long before a still greater misfortune overtook it. Few, if any, real artists were connected with the craft, and as the demand was a growing one, the making of windows fell into the hands of enterprising business houses, who

soon began to do a lucrative trade in whatever style happened to be in vogue.

Practically nothing had been done in England until 1838 to raise the standard of Glass painting, or to acquaint the public with its true principles; but in that year, Mr. Charles Winston, of the Inner Temple, who had devoted much time and energy in its study, compiled a treatise in which he classified the various medieval styles on the lines of Rickman's "Classification of Gothic Architecture." This treatise developed into the larger "Enquiry" which was published in 1847, and that work still retains its position as one of the foremost authorities. Winston was one of the first to impress upon the public the self-evident truth that Glass Paintings are likely to rank as works of art only in so far as they are the creation of artists, and he strove incessantly to liberate the craftsmen of his day from the mechanical imitation of ancient workmanship.

Near the close of Winston's career, Mr. Dante Gabriel Rossetti directed the attention of Messrs. Powell, the well-known Glass-makers of Whitefriars, to the work of a young artist—Edward Burne-Jones—whose talents were rapidly obtaining recognition amongst patrons of art. Burne-Jones executed several designs for Messrs. Powell, notably the "St. Frideswide" window in Christ Church Cathedral, Oxford; but his name soon became associated with that of William Morris, who had by this time thrown himself heart and soul into the cause of art, and until Burne-Jones' death, his designs for windows were executed by the little colony of workers at Merton Abbey, founded by Morris. Morris not only brought together a band of gifted men sincerely devoted to art, but he worked in Stained Glass with his own hands, and in co-operation with his friend, Sir Edward Burne-Jones, who, as I have said, furnished the designs, he gave to the world a series of windows which exhibit an originality of thought, a delicacy of expression, and a splendour of colour never before attained by contemporary craftsmen. Old vices die hard, however, and notwithstanding the influence of Winston and Morris, a great deal

remains to be done in the furtherance of this attractive form of art. Many popular misconceptions call for correction, and the warfare against the traffic in commercial glass must be carried on almost as relentlessly as ever. The notion that modern craftsmen should model their designs after those of medieval times is still widely held, and although the commercial houses have been compelled to raise the general standard of their work, both as regards colour and design, it still remains true that a large proportion of present-day work is entirely destitute of aitistic value. Real progress will only be possible when the public come to understand that stained glass is a decorative art whose expression and application alike are governed by technical conditions, and that the glass painter cannot enter into any sort of rivalry with the painter in oils or water colours. The uninitiated invariably insist on obtaining the effects of pictorial art, but this is exactly what the glass painter cannot supply. The primary object of a window is to admit light and to exclude the atmospheric elements, and the decorative possibilities of the glass are secondary to that object. In so far, indeed, as the glass painter is a genuine artist, his work will frankly recognise and turn to good account the iron bars and lead lines which the untrained mind would so gladly dispense with. Knowing the technical limitations under which his material is applied, his chief concern will be to enhance the beauty of the glass itself. Window decoration of the best kind has always been, and is still, a mosaic art, and the laws of mosaic prevent the glass-worker competing on equal terms with the painter in oil or water colours. To say so is not in any way to despise the power of glass in the hands of a competent artist. Every form of art is more or less limited in its application. The painter in oil or water colours can never attain to the perfection of rounded form produced by the sculptor's chisel, nor can the glass-worker apply his colour with the subtle gradation of tone demanded by the more complicated forms of pictorial art. His composition is executed in innumerable pieces of coloured glass arranged within a framework of arbitrary formation, and such a

composition cannot possibly be appreciated or understood if it be thought of as a picture.

Nothing is more striking in ancient glass than the evidence it affords of the primitive worker's grasp of the essential conditions of his art. To him nothing was so priceless as the inherent beauty of the glass itself. All his efforts were directed to bring out the glorious colours of which the material is capable. Window decoration was the object he aimed at—never the making of glass pictures.

Probably the oldest glass to which a definite date can be assigned is to be found in Le Mans Cathedral; but very early windows are to be seen almost everywhere on the Continent (more especially in France), as well as in some of the English Cathedrals. By far the finest ancient glass in existence is in the Cathedrals of Chartres and Bourges; but the student can begin his studies much nearer home. York Minster contains not only a fine example of ancient Grisaille in the famous "Five Sisters" window, but almost the whole field of glass painting from the XIII. to the XVI. centuries is to be found there. Wells Cathedral contains an exquisite "Jesse" window of late XIII. or early XIV. century work, and beautiful XIII. century glass is to be found in Lincoln Cathedral. XVI. century glass may be conveniently studied in the Lady Chapel of Lichfield Cathedral, Fairford Church (Oxfordshire), and King's College Chapel, Cambridge.

But however fascinating the study of ancient glass may be, it must never be forgotten that if the art is to be rekindled into life in our midst, this can only be effected by encouraging the modern craftsman to put whatever individuality he is possessed of into his workmanship. When all is said, the modern worker has many advantages over his primitive rival. He has a much larger range of coloured glass to choose from, and his draughtmanship is incomparably superior. Given a subject suitable to the situation of his window, he is without excuse if he fails to produce an effecting work of art.

Anyone who is inclined to despair of the future of stained glass

should see the Morris windows in Manchester College, Oxford, and Oxford Cathedral, or Henry Holiday's "St. Hugh" window in Lincoln Minster. Windows such as these show what the art is really capable of in the hands of artists. They demonstrate conclusively that the chief barrier in the way of progress lies with the public, who go on from year to year filling church windows with the mechanical productions of tradespeople. The charm of stained glass lies in its richness of translucent colour, its tones of glittering contrasts, its solemn splendour and wistful impressiveness. Beautiful, it may be, alike in arrangement and design, but in the final analysis its glory will be found in its colour.

On the motion of Mr. Forth (Principal of the Municipal Technical Institute), seconded by Mr. John Brown, and supported by Dr. Sheldon, a hearty vote of thanks was passed to Mr. Taylor.

4th January, 1905.

The Lord Mayor (Sir Otto Jaffe, J.P.) in the chair.

NATIONAL ANTARCTIC EXPEDITION.

By Hartley T. Ferrar, B.A., F.G.S.

A lecture, illustrated by lantern views, delivered in the Young Men's Christian Association Hall, Wellington Place.

8th February, 1905.

Mr. W. H. Patterson, M.R.I.A., in the chair.

THE WORK OF THE ULSTER FISHERIES AND BIOLOGICAL ASSOCIATION.

By Professor Gregg-Wilson, M.A., D.Sc., M.R.I.A.

(Abstract.)

Dr. Gregg-Wilson said the Ulster Fisheries and Biology Association was started nearly two years ago. It was soon decided to establish a marine laboratory at Larne Harbour with a view to the investigation of local waters. Larne was chosen because the lough offered shelter in almost all conditions of weather and because the neighbourhood was so varied in character that large tracts of sea-bottom covered with mud, sand, gravel, and rocks might be found close at hand. A small house in Ship Street was rented, and fitted with all the necessaries for studying and preserving marine animals. A launch was procured, and collecting apparatus of various kinds. Then Mr. Joseph Pearson, B.S., was engaged as naturalist, and the services of a very efficient boatman were secured. The ordinary work of the Association was largely carried on by means of the dredge and tow-net. With the former the animals that lived on or in the bottom of the sea were captured ; with the latter such creatures as drifted with the tides were obtained. Fishing with larger nets for the more active inhabitants of the sea was practised, and shore hunting with spade or graip or hand-net was also largely pursued. The results of the work of the Association had been many. In the first place, the waters of the Larne district had been sub-divided into areas, and

records of all animals found in these had been kept. They were thus gradually getting an idea not only of all the local animals, but of their associations. In the course of this work a considerable number of species not known previously as Irish had been met with, and a few of these had been recorded in the "Irish Naturalist." Further, in connection with the local work it had been found necessary to prepare lists of all known Irish species of some groups, and several such lists had been compiled. One of them—a list of the copepoda of Ireland, by Mr. Joseph Pearson—was now in the printer's hands, and would be published by the Fisheries Branch of the Department of Agriculture. This list would be of great use as showing in handy form the results of all previous work at Irish copepods, besides recording new species obtained by Mr. Pearson. The group was one of the most important for the marine biologist, as members of it were largely fed on by fishes. Besides their lists of marine animals they had now a list of the sea-weeds of Ulster, prepared by a Dublin visitor to their laboratory—Mr. J. Adams. A totally different but equally important kind of work had been carried on by Mr. C. Cunningham, who had undertaken the investigation of the drifts of our waters by means of bottles containing postcards. The bottles were prepared so as just to float, with very little surface exposed to the action of the wind. They were distributed at intervals along definite tracts, and the distribution was repeated with changed conditions of wind and tide. From such work very definite results had already been obtained, and these would soon be published. The facts were important in connection with the drift of floating eggs of fishes, as well as with reference to the movements of minute animals that served as food for fish. A great deal of attention had been given of late by members of the Association to the study of the herring. This fish was increasingly important for Ireland, but very little was really known as to its habits and the reason of its movements. Yet every stage of its life-history offered problems for study. Its eggs were eaten by fishes and destroyed by fishermen, but the numbers of adults

were maintained wonderfully. The larval forms and young were consumed in vast numbers by other fishes, by porpoises, and by birds ; and the very interesting question arose as to the wisdom of our not waging war on these enemies of the herring. The migrations for food with a view to spawning were no less in need of study. It was necessary, however, before pronouncing on such subjects to take a broad view of the facts, and the work of the Association would, it was hoped, help them to obtain that. With regard to the future, it might be said that, besides carrying on the present investigations, it was proposed to make a special study of plant associations in their waters, to greatly extend their work at Lough Neagh, where pollan, eels, and mysis all were attractive, and to endeavour to secure for the Association a new and suitable laboratory at Larne Harbour. That would be of the greatest service to workers, and would probably be of great use for future teachers of nature knowledge.

Mr. John Dickson, in proposing a vote of thanks to the lecturer, urged the necessity for a thorough investigation into the question of fish food and spawning. By so doing the Association would confer a great benefit on both Irish and English fisheries.

Mr. William Faren formally seconded the motion, which was passed.

Professor Gregg-Wiison briefly replied.

14th March, 1905.

PROFESSOR JOHNSON SYMINGTON, M.D., F.R.S. F.R.S.E., in the chair.

WITH THE ROYAL SOCIETY OF ANTIQUARIES (IRELAND) ON A CRUISE ROUND THE IRISH COAST.

BY S. F. MILLIGAN, M.R.I.A., Vice-President for Ulster.

THE cruise, which commenced on 21st June, 1904, was the fourth inaugurated by this Society, and was a source of undiminished pleasure to all concerned.

There were two previous cruises around portions of the Irish coastline, and another to the Hebrides, but this was the first occasion on which a tour was made all round Ireland from Belfast to Kingston, going by the North, the Western, and Southern shores, and calling at all points of special interest *en route.*

The s. steamer "Magic," belonging to the Belfast Steamship Company, started at 10-0 o'clock a.m. with about 140 members, including a number of the members of the Cambrian Society, who were privileged to join.

The sail along the Antrim Coast was very pleasant, as the course was quite close to the shore until Rathlin was reached, when a stop of about two hours was made. The vessel anchored in Church Bay, close in, and a good view of that part of the Island was obtained.

It had been arranged to land here, but when it was considered how few objects of antiquarian interest were within reach, it was decided by the majority that we should proceed around the North Coast as closely as possible and enjoy the view, the weather being

most favourable. Fair Head is always a most striking object on the Northern coast, and looked very fine on this occasion. The headlands of the Causeway soon came into sight, and an extremely fine view of it was obtained, as well as of the White Rocks towards Portrush. After passing quite close to the well-known Northern watering-place, the vessel steamed straight for Malin Head, the most Northern portion of Irish land. There is always, even on the calmest day, a jumble in the water between the Island of Innishtrahull and Malin Head, and the present was no exception. We soon entered Lough Swilly and got into quiet water, anchoring close to the little town of Buncrana. It was a lovely moonlight night, and a large number, after dinner, landed to inspect the town of Buncrana, which is a charming little watering-place, with good golf ground, connected with Londonderry by rail, from which it is distant about 15 miles. The castle of Sir Cahir O'Doherty is the principal object of interest at Buncrana. Sir Cahir was a notable personage in Innishowen in the days of good Queen Bess, and his castle and grounds are now owned by Mr. Richardson, of Belfast. Lough Swilly is notable in Irish history as the place from which the Earls took their flight from Ireland—viz., Tyrone, and O'Donnell. It was also from here that young Hugh O'Donnell was enticed aboard an English merchant ship, and conveyed a hostage to Dublin Castle, from which he afterwards escaped. The scenery of Lough Swilly is very fine, high mountains surrounding it on all sides, and the entrance and some of the islands are strongly fortified, so that it can be used as a naval base in time of war.

We left Lough Swilly early on the morning of Wednesday, 22nd, for a very long sail—viz., for Blacksod Bay on the coast of Mayo. A delightful view of the coast of Donegal was obtained, also of Horn Head, and on to Torry Island, on which, however, we did not land, having visited it before. A view of ever varying beauty was unfurled as the vessel's course lay along the indented coast of Donegal, passing Glen Head, and reaching Slieve Liag, to which we approached very closely, and a fine view

was obtained of these noble cliffs, rising 2,000 feet in perpendicular height, and extending for miles in length. The course was now for the Island of Innishmurray, in Sligo Bay, a veritable storehouse of ancient Irish structures, and which we visited in 1895. It contains a cashel, in which are bee hive huts, ancient churches, standing stones, and altars, dating back to Pagan times, all of which have been minutely described in our transactions.

The kindness and hospitality of the people is well known, and many old customs still continue, including the use of stone querns or hand mills, which are still in use.

We left the Island about 6-0 o'clock p.m., and steered for Blacksod Bay, which was reached at 10-0 p.m. Here we anchored for the night in perfectly smooth water, being protected by a long strip of land called the Mullet, about eighteen miles in length, running north and south, and giving perfect shelter from the Western Atlantic. The Island of Achill lay south of us, and the huge mountains of Slieve More and Crohaun rose high in the moonlit sky, and added greatly to the charm of the scenery.

Next morning, mid-summer day, we called at a little village called Falmore, and examined the ruins of an ancient church and a holy well close by the church. The latter possesses many points of special interest. We continued our course around the great cliffs of Achill, and entered Clew Bay, making for Clare Island, which we reached in the afternoon, and landed. We visited a little village where are the ruins of Grace O'Malley's castle, and walked across the Island for a couple of miles to the ruins of a small Monastery of the Cistercian Order, which is probably early 15th century date.

The Congested District Board have bought the Island, and divided it into separate farms, and have in many ways greatly benefitted the inhabitants, who are now fairly prosperous. We procured a pilot at Clare Island, and sailed to the opposite coast of Mayo, and entered the well-known estuary of Killery Harbour, which runs up amongst the mountains for fully seven miles from the sea. The great mountain of Mweelreagh, 3,000 feet in

height, guards its entrance on the northern side, and as the vessel proceeded amongst the hills a scene of ever-changing beauty was presented to the view. The Channel Fleet, some nine large vessels, have gone up the channel and anchored almost within sight of M'Keown's Hotel at Leenane.

When we anchored, a steam launch belonging to the "Magic," with a number of life-boats in tow, proceeded and landed us close to the hotel. Being Mid-summer Eve, a number of Baal fires were burning on the high grounds all around, a custom which is not yet abandoned in the Irish-speaking districts of Ireland. Leenane is the finest centre from which to see Connemara; tourist coaches pass to Westport and to Clifden, there is good fishing, boating, and shooting, and splendid mountain and sea air.

The party enjoyed themselves at Leenane, where there were Irish fiddlers, Irish jigs, and Irish songs galore. An early start was made next day, after taking in a supply of salmon fresh out of the water, fresh meat, eggs, &c., which had been previously ordered. The Arran Islands was the next stopping place. Innishmore, or the great Island, was reached early on Friday, 24th, and on the remainder of that, and the following day (Saturday), was spent visiting the points of interest in the three Islands; but as they have been so frequently described, we shall only add that for very early churches and prehistoric forts they stand unrivalled in Europe. On Saturday afternoon we sailed up to Galway City, and anchored at Mutton Island. A number of the members visited the city on Saturday evening, and also on the forenoon of Sunday to worship in the various churches. A special early service was held in St. Nicholas' Church for members of our party, at 8-0 a.m., and a great many attended and greatly enjoyed the service.

We left Galway at 3-0 o'clock p.m. on Sunday, and sailed direct for Dingle Bay, anchoring for the night in Ventry Harbour. The magnificent panoramic view of the Western coast of Ireland from Galway Bay to Dingle, on a brilliant day in June, sailing

close to the coast, is one which will never be forgotten by those who were privileged to see it. We passed close to the cliffs of Moher, and saw Kilkee shining brilliantly in the sunlight, and on southwards past Tarlee Bay, Smerwick Harbour, the vast mountain chains of Slieve Mish and Brandon, ending in Brandon Head. Before entering Dingle Bay the group of islands known as the Blasquets were passed, and then Ventry Harbour. Here we anchored for the night; the moon was full and shining brightly, the little inlet was unruffled, the tide flowing gently in, and on board a choir of ladies and gentlemen singing hymns, being led by a lady at the piano—the whole was soothing and restful after the week's excursions.

Next morning, after landing, a start was made. We had a walk before us of six miles, as no vehicles were obtainable. The walk led along the coast from Ventry to Dunmore Head, and the whole coast line was dotted with prehistoric buildings, bee hive huts, in groups and singly, between Dunbeg and Dunmore. It is an Irish-speaking district, English is not spoken or understood except by some of the children, who speak both tongues. Space will not permit any attempt at describing the unique fort of Dunbeg, which is a fortified headland, or the lovely scenery or the bee hive huts, which have been called the ruined City of Fahan, in the district of Glen Fahan.

The steamer followed us, and we embarked in boats at a pier built by the Congested Board, and rejoined the "Magic," starting at once for the Skellig Rocks. A boat load of about twenty-eight persons got landing on Skellig Michael, of which the writer was one. It was intended others should follow, but when the sailors who landed our party returned to the ship, they refused to bring any more out, saying it was too great a risk. It was a great disappointment, but I believe the sailors acted wisely, as the landing-place is very dangerous. The walk up the cliff, cork-screw wise, and then the final climb to the top of 650 steps, or rude stone stairs, required good climbing powers. The view was glorious beyond description. There were birds everywhere, the

only occupiers besides the birds being three lighthouse keepers. The smaller Skellig was white as snow with the birds, which are very tame, and would sit on the rock till touched.

We rejoined the ship, happily without accident, and the visit to the Skelligs terminated. Many were disappointed at not landing, but that could not be helped. We continued our course, and entered Bantry Bay, one of the finest, if not the very finest, in the United Kingdom, and sailed past Beare Island, anchoring close to Glengarriff. The Channel Fleet was lying at anchor in the bay—some ten vessels—as we passed, which added very much to the effect, combined with the splendid scenery.

On Tuesday morning we left Bantry Bay, calling at Clear Island, and afterwards at Baltimore, the great fishing village of the South. On an island here is Sherkin Abbey, built for the Franciscan Order. We left Baltimore for Cork Harbour, which we reached after a fine sail along the South Coast, in the track of the American liners, one of which we passed. We stayed at Queenstown for the night, and left the following morning, calling at Ardmore, in County Waterford, to visit the ecclesiastical antiquities of that well-known place—viz., round tower, ancient church, and 15th century cathedral, holy well, &c. We next called at Bag-in-Bun, in County Wexford, the spot where the Anglo-Normans first landed in Ireland, and after examining the earthworks supposed to have been made by Raymond-le-Gros, we proceeded to Kingstown, which was reached as the clock at the harbour was striking 9-0 p.m., the hour arranged in our programme before we started. The English and Welsh visitors remained on the "Magic," which proceeded direct to Liverpool, and the others proceeded homewards by rail. Thus ended the most delightful cruise that the Society have so far carried out.

4th April, 1905.

Professor Johnson Symington, M.D., F.R.S., F.R.S.E., President, in the chair.

RUSSIA: ITS PEOPLE AND POLITICS.

By John Horner.

(Abstract.)

Mr. Horner said at the present time, when Russia was absorbing so much of the attention of the world, it might be considered not unprofitable to initiate a discussion with the object in view of arriving at a better understanding of her people and her politics, and of forming an opinion of the mighty struggle for mastery in Asia with somewhat less of partiality. It was difficult for them to look upon Russia in any other light than that of a hereditary enemy, whose aggression would interfere with their established rights, and it must be confessed that fears of such aggressions were not unfounded, for Russian Foreign policy from the time of Peter the Great had been one of expansion. Up to the 16th century little was known to other European nations of that great country; its intercourse with them was thus of comparatively modern origin. The various events relating to the Russification of Poland and Finland having been referred to by Mr. Horner, he showed that for the absorption of those countries Russia was defended by reasons geographical and strategic. Although they looked with suspicion on her southward march, they must in full justice give credit to her for keeping alive the spirit of Christianity in the Balkans. An impartial study of the history of Turkey and her dealings with her Christian subjects

would show conclusively that Russia's interference was not one solely of land-grabbing. Her motives were higher, and those motives seemed to be recognised when in her last war with Turkey Europe stood aside and permitted the Turk to receive the chastisement he so richly deserved. Turning to the acquisitions of Russia in Asia, and tracing them step by step through the vast continent, they found Russia now at the Pacific Ocean and face to face with Japan, a foe more formidable than any she ever faced in Europe. Russia's first advent in Asia began in the early part of the 18th century, although long prior to that time a considerable fur-hunting trade had been established. Her march through Asia had left in its train order and civilisation. It was but natural that a great and civilised Power like Russia should extend her influence over Siberia, bringing under subjection the barbarous hordes which for centuries had run riot. They, therefore, found along the line of the trans-Siberian Railway flourishing towns endowed with universities and first-class educational establishments and technical schools of a high order, and as a natural consequence of those manufacture, trade, and commerce extending. The barbarities which made Central Asia a hell upon earth had passed away, and the horrible tortures perpetrated had been abolished. Russian rule in Mohammedan Asia kept in check any possibility of a pan-Islamic movement of the Crescent against the Cross, which the fierce religious fervour of the Mussulmans was only too prone to bring into great activity. A spark would set the movement ablaze but for Russian power, and start again the vengeful wars and cruel massacres which for centuries were rife in Turkestan. Let them glance at the present war and the probable outcome of its results. Russia, as shown, had marched steadily across Asia. Her work in reducing to subjection the numerous tribes which opposed her path had been fraught with great benefit. A huge railway had been built at a cost of £100,000,000 sterling, which enabled the Atlantic and Pacific to be united across two continents. This work had been done at the cost of valuable life and treasure, and the natural return for all this outlay was a

free Pacific seaboard. The trans-Siberian Railway was built politically for Russia, commercially and practically for the whole of Europe. The trade which Russia had opened up in Asia was carried on in a greater degree by Europeans. The railway gave a great stimulus to that trade, and the result of the present war would probably lead to the abandonment by Europe of a commerce which had every prospect of being large and profitable. A momentary look at the commercial relations of the two contending Powers with other nations would serve to explain what was meant. Russia was free to foreign enterprise, as free as Britain or the United States. Most important manufacturing interests were owned by these countries and other nations, notably France, Germany, and Belgium. Flax and cotton manufacturing concerns, machine works, and other commercial and industrial enterprises were owned and controlled by different nationalities, every facility being given and every protection accorded. Besides this, Russia was a good customer to other European States, consuming some £70,000,000 sterling of goods annually. What of Japan? European trade there was very limited. The Japanese were rapidly becoming dangerous competitors. Commercially, Japan was closed to foreign settlement. No foreigner was allowed to own land or engage in industrial pursuits. The natural imitative faculty of the Japanese enabled them to produce goods of European design, stamped with European trade marks, perhaps not yet equal to European standard, but quite good enough for Asiatic consumption. Our vast floating capital, with loss of interest and freight and insurance charges, was saved. A Jap would live at one-fifth the cost of a European. Consider, then, that Japan was making all and more than she needed for herself how enormous were the advantages she had against her competitors in Asiatic markets. They had often heard of the yellow peril and of the possibility of the Mongol race one day dominating the world. Did there not seem a possibility of Asia being commercially dominated by the yellow race at no very distant period of time. Once Corea and Manchuria got into the hands of Japan

or under Japanese jurisdiction, the outlets of the trans-Siberian Railway would be theirs at the expense of Europe. The Mongolian Powers were geographically divided. Manchuria stood between Japan and Corea and China. Manchuria in the hands of Japan would remove this impediment, and a victorious Japan, with all the power and prestige gained by war, would be in a position to undertake the regeneration of the Mongolian people. When the countless millions of China were brought under economic and military organisation by Japan they might say good-bye to European prospects, commercially or otherwise, in Asia.

Agriculture was the main industry in most countries, but more especially in Russia, where the peasants numbered 82 per cent. of the entire population, a proportion somewhat similar to Ireland, and the agrarian question there, as with us, was the most important question of internal politics. A character sketch of the peasant serves as a sketch of the people. One thing which impresses a stranger was the extreme devoutness displayed by the people. A Holy Shrine was never passed without due reverence being paid to it; the churches were filled with kneeling, prostrate forms. Naturally one asked the question—Was all this real? Tolstoi said it was. On the other hand, a Russian historian stated that the people were remarkable for a state of religious indifference, as to be without parallel in the annals of Christian nations. These opinions appeared conflicting, but if analysed showed a harmony. The Russian peasant was undoubtedly indifferent to religion, as we term it, for the simple reason that he did not understand it; but apart from religious doctrines, he carried with him into his everyday life the moral principles which regulated the relations between himself and others. The want of religious knowledge—of theology—was to be attributed to the relations existing between the peasant and his priest, or pope, as he was called. It was an extraordinary fact that the Russian revered his church and despised his priest. There was undoubtedly no spiritual relation between the Moujik and his pope, the latter had no influence, moral or otherwise, over the masses,

and enjoyed no confidence among them. They were looked upon by the people simply as traders, who made a profit by performing the Sacraments. Beyond such functions the power of the priest was not felt. It was said that the Russian Moujik may be called religious if the term is applied to social philosophy based on ethics, and not on theology. There was a system of moral principles dominating the life of the Russian peasant which, from whatever cause it sprang, may be termed religious, although it may be apart from any religious doctrine. The moral principles taught by the church have been inculcated, owing probably to the fact that the people were predisposed to accept them, although they seemed to have little conception of the general structure of their religion. Living in communities as they did, they were loyal to each other, and more than charitable, not alone to members of their own class. One writer spoke of "The wonderful preservation of the purity of the moral character of the Russian people through such a terrible ordeal as three centuries of slavery, which passed over without ingrafting into it any of the vices of slavery 'could find no other explanation than this,' the peasant was never separated from the ploughshare, from the all-absording cares and poetry of agricultural work." There was one vice, however, to which the Russian peasant was addicted—viz., that of imbibing strong drink when he has money enough to give him the opportunity. The Government was now grappling with the question, and had succeeded in mitigating the evil considerably. It was to be wondered that in the midst of all his surroundings the Russian peasant was what he was—good humoured, kindly, sociable, and hospitable. His privations were often great, his earnings at the most scanty. Hygienic arrangements were poor, and disease and death rife, and still he remained working hard for mere existence, and fighting his terrible winter with a dignity all his own. A Russian writer thus spoke of him: "Through all the varieties of types, tribes, and past history, the millions of our rural population present a remarkable uniformity in those higher general ethical and social conceptions, which the

educated draw from the divers social and political sciences, and the uneducated from their traditions, which are the depositories of the collective wisdom of past generations." Statistics recently taken showed only 20 per cent. of recruits literate. This is a most deplorable state, but it seemed to point to what the future of Russia must be when some 60 millions of her peasantry received the benefits of an education which would enable them to rise to a sense of their duty to their country and themselves.

President Hamilton said he was not one of those who were possessed by a great admiration of Russia. Mr. Horner, he believed, was, as he knew from personal conversation with him. But it did not seem to him that the Russian Empire ought to be very much an object of admiration. One ought, however, to draw a distinction between the moujik and the empire. The Russian peasant was all, he thought, that had been claimed for him by Mr. Horner—a well-meaning, honest, ignorant man—but, taking the country as a whole, it seemed to him (the speaker) to be a vast, unwieldy mass of semi-educated, semi-barbarous people, governed, he supposed, by one of the worst systems of government which had ever cursed a nation. Mr. Horner had held up before them a picture of what might happen to them from what was currently described as the yellow peril; but he did not know that they need very much dread the ascendency of the yellow race if that yellow race was to be such a people as they had seen in recent years the Japanese prove themselves to be. It might be that Russia could call itself Christian, while Japan was not Christian; but he confessed if he had to make a choice between seeing Asia dominated by a Christian nation of the type of Russia, or by a non-Christian nation of the type of Japan, he should not for a moment hesitate to choose the latter. They had within the last year had a marvellous revelation of what a little nation by means of education, by means of a splendid patriotism, and by means of adapting itself to Western ideas, had been able to accomplish in a short space of time. He very much questioned if throughout the entire audience that evening there could be found half a dozen

people who would prefer to see Asia ruled by Russia to Asia dominated by ideas and sentiments such as they had seen put to the test in the case of Japan. He had been very much interested in the latter part of the paper, in which Mr. Horner had described to them so vividly and accurately the internal economy of Russia; and, although many of them differed from the lecturer, they were indebted to him for the mass of information he had placed before them, and for the pains he had taken to give it to them in a manner so succinct and interesting.

Mr. William Armstrong asked if it was not the case that the import duty in Russia was heavier than in Japan.

Mr. Seaton F. Milligan said Mr. Horner had not dealt with a subject which he expected to gain some information upon; that was as to the system of bribery and corruption which was so flagrant in Russia. He believed the Japanese would be a Christian nation before the end of this generation, and that the danger of the yellow peril referred to by Mr. Horner was not so great as he represented.

The Chairman regretted that Mr. Horner's paper had not excited keener discussion. One would have thought it was only necessary to mention the name of politics in this town to provoke very keen discussion, and apparently they had fallen upon very peaceful days.

In replying, Mr. Horner said he had purposely made the paper pro-Russian to evoke discussion. There was a feeling of antagonism to Russia which he honestly believed was not a true one. There was no question, he thought, that the Mongols despised the European races. They had a religion, a philosophy, of their own which was far older than theirs, and they looked upon it with so much reverence that he very much feared that the next generation would not see the Mongol races Christianised. Even the civilisation which Japan had copied showed that that country was open to adopt what she might consider right for her best interests, but she had not copied their philosophy or religion. Mr. Armstrong had asked regarding the duty versus Russia and Japan.

He could not say, but he believed it was a fact that Japan's imports were small in comparison to Russia's. Japan was practically making everything she wanted. Mr. Milligan had alluded to bribery and corruption. He had not referred to that subject owing to the exigencies of time. He had stated that the Government of Russia was one of the worst which ever cursed a nation. He thought the bribery and corruption which came from that system of government could not be defended by him or anyone else. Bribery, which at one time was exceedingly rife in Russia, was largely diminished during the reign of Alexander III., who did much to purify Russian officialism in this respect. Mr. Horner proceeded to defend the Russian Church from the charge of intolerance, and in conclusion referred to certain authorities, the reading of which he was sure would give them a more favourable idea of the Russian people.

IRISH GHOST-LORE.

By E. J. M'Kean, B.A., B.L.

Even the most superficial collector of Irish folk-lore cannot fail to see that in Ireland we have a really enormous number of ghost stories. This statement is true of all parts of the island, and these stories have been greatly neglected.

Our Irish ghost-lore is scattered broadcast through town and country. Perhaps no Irish town is without its ghost or spectre, or at least a phantom carriage. Probably it is not too much to say that every country parish has its "bad spot." A "bad spot" means an uncanny place where eerie things happen, nothing very alarming, but plenty to cause goose-flesh. These "bad spots" are generally on the roadside, and often enough no one knows how they come by their reputation.

There are, too, abundant stories of wraiths. In and round Belfast it is said that to see a wraith in the morning is of good omen, and fortells a long life; but if seen at night it bodes death. W. S. Smith, in one of his pamphlets, says "sudden death," but I have never heard of this belief, if he does not mean "speedy death." A Waterford working-man told me that the wraith is seen seven years before death, during which time the doomed man or woman "is with the fairies."

The stories I am going to narrate all came under my notice as I was collecting folk-lore, and most of them are, so far as I know, quite new. One of the tales is indeed well known, but I think I am justified in telling it once more to a Belfast audience, if only to show that it probably still lives in tradition.

A ghost said to be well-known in several parts of Ireland is Petticoat loose. There is a story that she is a woman who danced her feet off, but this tale I have on no authority, nor do I know whence the account comes. She used to appear at one

place near Dungarvan, County Waterford, and the Waterford man above-mentioned told me she haunted a road near the town. So strong and fierce was she that she would kill passers by at her caprice. She also at times jumped up on a horse's back behind butter kegs going to the market, and so heavy was she that she sometimes killed the horse. At last a priest laid her "by his calling," and she is now at the Red Sea making ropes of sand.

Dublin has a copious ghost-lore, but I was unfortunately not much with those who could best tell me it. For this reason I have been obliged to pass over many tales as worthless to me because I know nothing of their origin, or because they are obviously either made or moulded by educated persons. Still, one fine day late in October, 1903, I walked up past Glasnevin Cemetery, and found a labourer leaning against the bridge over the Tolka. He after some time yielded me up the following two stories:—

There was a house near Glasnevin supposed to be haunted. Some people took it, and one evening when a little girl was there alone a man, or woman, in white came out of a door of one of the rooms and blew at her. The child pined and died. The tenants got a priest to come and say Mass in the house, and since then it has been quite safe.

He also told me that his grandfather, who lived to be over a hundred, said that once in his youth he knew a man named Mike (I am not quite certain of the name). This man had a piece of land near Glasnevin, and employed there a labourer named John Byrne, who was with him a long time. This Byrne had a daughter who died. Some four years after her death Mike was going along the road to his field, and, as he thought, passed the girl. He wondered, but went on. On his return he again met her, and said, "In the name of God, is that Maggie Byrne?" "It is," said the girl. "But I thought you were dead." "I have been dead four years: but don't be afraid! Take your boots off, turn them upside down, and stand on the nails." She then asked him to do for her some commission, which he never told; and she

further told him that he would be dead within twelve months. 'And sure enough, he died on that day twelvemonth.'

There is a belief in Dublin that to have any dealings with a ghost means death within the year.

Another town of superstitions is Drogheda. There is a ghost in the barracks there, said to be that of the occupant of an old barrow on which part of the barracks is built; and a fairy dog is seen in one of the streets at twelve o'clock each night. The following story was given me by a servant coming from this town: A landlord in the neighbourhood of Drogheda, as he lay dying, had all his live-stock brought under the window of his room, where he could see them. As he died, he exclaimed, "—town, beautiful —town! how can I leave you?" After his death "his spirit" haunted the place for many a day. It attacked men in the grounds and "walloped them so that they never got over it." No one could live about the place, and priests were got to lay the ghost. The first ten or eleven priests were unsuccessful, and none got over their dealings with the fierce spirit. The eleventh or twelfth priest succeeded. When the ghost saw him, "having got leave to speak," he said, "You're the man for me." The priest got him into a "wee red house" that had been built on the hill, and there he remains. He was the great-grandfather of the present owner of —town.

Belfast is a more modern city than any of these three places, yet it has its ghost stories.

Donegall Street has had its ghost, that of a well-known Belfastman, who was seen after death walking about his office and sometimes coming to the window and looking out. He always appeared after nightfall, and was always in evening dress.

Another ghost came every night for his horse. He was not seen, but at twelve o'clock each night three blasts of a horn were heard, the horse went out of its stable, and was afterwards found covered with mud. This ghost was laid by a priest, as I was told by an old beggarman. The priest—who was afterwards Roman Catholic Bishop of Belfast—laid the ghost by long fasting

and prayer. He fasted four days, "reading" all the time, and the ghost appeared to him. He then compelled the ghost to enter a bottle, but without saying a word to him. "The Word" was sufficient, says my informant. The priest then banished him in the bottle to the Red Sea, where he is to remain for the rest of his "natural life," which was explained to mean "as long as there were people living on the earth."

There is said to be a tombstone in Newtownbreda Churchyard laid flat on a grave. This covers the bones of a man who said that whatever was done he would not rest quiet in his grave. His wife was resolved that he should, and laid a heavy stone above him. But the restless ghost is always struggling to escape, and, it is said, has already broken two tombstones, and by this time has succeeded in cracking a third.

A servant girl told me that there is a ghost laid in Ballydrain Lake. She did not know much of the story; but it seems this ghost used to appear frequently to a Roman Catholic girl who lived near the lake. She complained to her priest, who asked her where she would have it laid. She told him to lay it in the lake, and it was laid there. Many are afraid to pass the place after dark.

From the same girl I got an account of the best known of all our local ghosts—James Haddock. She gave me the traditional account; but as she told me she got it "from a newspaper, and also from hearing people talk about it," I cannot be sure that the tradition is still current in the countryside.

James Haddock, of Drumbeg, at his death, told his wife to keep his farm till his son was twenty-one, and then to hand it over to him. Instead the wife remarried, had a second family, and with them continued to live on the farm. At this Haddock came to a man whom he met on horseback on the road, and told him to tell her to do as he had desired. If she refused, the messenger was to tell her "that he (the ghost) would wreck the whole place." The ghost got up behind the rider to tell him this. At first the man did not go, and Haddock appeared to him

several times, the second time "at a dinner-party, when he went into a room by himself." The haunted man went at last to the lawyers, who laughed at him and asked him for his witness, refusing to pay heed to the ghost. The disappointed suitor then went back to the ghost, who said, "They were to call him three times, and he would appear in court" as a witness. The triple call was made, and "a hand and part of an arm appeared and struck the table three times," so that the court shook. The lawyers then believed, and gave the lad the farm. The man went back, and the next time he met the ghost asked him if he was satisfied. The ghost said he was, and thanked the man greatly. Some one had put the man up to ask the ghost whether "he was happy," but the ghost told him that if it was any one else he would have torn him in pieces for the question. They have thrown down his gravestone in Drumbeg Churchyard to keep Haddock down, and it remains so to this day.

In the Ulster Journ. Arch. III., 325, W. Pinkerton has an excellent article on this story, giving the tradition and also the old accounts from More's editions of Granvil's "Sadducisinus Triumphatus" and Richard Baxter's "Certainty of the World of Spirits."

It will thus be seen that everywhere about us is a multitude of these stories. They are well worth collecting, if only for the dramatic nature of some of them; but if they are collected at all they should be most carefully committed to paper or they are of no value as folklore.

ANNUAL REPORT, 1905.

The Annual Meeting of the Shareholders of this Society was held on 14th July, in the Belfast Museum, College Square North. The President (Professor Johnson Symington, M.D., F.R.S.) occupied the chair, and there were also present—Sir James Henderson, D.L. ; the President of Queen's College (Rev. Dr. Hamilton) ; Dr. Wm. Calwell ; and Messrs Robert Young, J.P. ; George Kidd, J.P. ; R. M. Young, B.A., J.P., M.R.I.A. (Hon. Secretary) ; John H. Davies ; Wm. Gray, M.R.I.A. ; Seaton F. Milligan, M.R.I.A. ; W. R. Rea ; Wm. Armstrong ; Joseph Wright, F.G.S. ; John Horner ; William Workman ; H. C. Montgomery ; D. A. Maxwell ; Isaac W. Ward, and Nevin H. Foster. An apology for inability to be present was received from Sir Robert Lloyd Patterson, D.L. The minutes of the last meeting having been read and confirmed,

Mr. R. M. Young (Hon. Secretary) submitted the Annual Report, which stated :—

The Council of the Belfast Natural History and Philosophical Society desire to submit their Report of the Working of the society during the past year. The Winter Session was opened in the Museum on the 22nd November, 1904, when an illustrated lecture was kindly delivered by Mr Francis C. Forth, Assoc. R.C.Sc.I., Principal of the Belfast Municipal Technical Institute, on "Technical Instruction in Belfast : a Retrospect and a Prospect", followed by a discussion in which the President and other educationalists took part.

The Second Meeting was held on 19th December, 1904, when Mr. James Taylor kindly gave a lecture on "Stained Glass, Ancient and Modern," illustrated by a series of special lantern slides.

The Third Meeting was held on the 3rd January, 1905, in the Wellington Hall, with the Lord Mayor (Sir Otto Jaffe) in the chair, when an illustrated lecture on "Some Results of the National Antarctic Expedition" was kindly given by Mr. Hartley T. Ferrar, B.A., F.G.S., geologist to the "Discovery" Expedition 1901-04.

The Fourth Meeting was held on 7th February, 1905, when a lecture was given by Professor Gregg Wilson, D.Sc. M.R.I A. ; subject, "The Work of the Ulster Fisheries Association," illustrated by numerous lime-light views.

The Fifth Meeting was held on 14th March, 1905, when Mr. Seaton F. Milligan, M.R.I.A., delivered a lecture ; subject, "Cruise around Ireland with the Royal Society of Antiquaries, June, 1904," illustrated by lantern views.

The concluding meeting took place on 4th April, 1905, when the following papers were read :—(1) "Russia : Its People and Politics," by Mr. John Horner ; (2) Some Irish Ghosts," by Mr. E. J. M'Kean, B.A., B.L.

There was a good attendance of the members, and of the general public at all these meetings. The different societies who hold their Meetings in the Museum continue to do so. As usual the public were admitted to the Museum at a nominal charge during the Easter Holidays, but the attendance was not as large as on some previous occasions, probably owing to the fine weather and various counter attractions.

The Members of the Royal Society of Antiquaries of Ireland attending the Ulster meeting in July were admitted free to the Museum, as on the last occasion of their visit in 1892. Those visiting the Museum expressed their gratification at seeing such a fine collection of Irish Antiquities belonging to a provincial society as contained in the Benn Room, especially such recent additions as the recent inauguration chair of the O'Neils, and other local objects. In regard to the museum collections there have been no changes of any note to report during the past year. The assistant curator has been much occupied in the cleaning, re-labelling, and otherwise looking after the collections in the various rooms. Some

valuable donations have been received during the year, especially a set of fine quartzite primitive implements from India presented by Mr. H. W. Seton Karr. A large number of valuable publications issued by the various scientific societies in the United Kingdom, and in foreign Countries have been received. Many of these works are of much interest. In this connection a notable addition is the highly illustrated work of the American Ethnological Survey of the Philipines. The United States Bureau of Ethnology continues to send us their important publications illustrative of the habits and customs of the various aboriginal peoples of America.

In accordance with the constitution of the Society, five members of council retire from office, all of whom are eligible for re-election. These are Mr. John Brown; Sir James Henderson; Mr. S. F. Milligan; Mr. Robert Patterson, and Mr. William Swanston.

Mr. Horner presented the financial statement, which showed that the total income for the year had been £209 5s. 2d, including subscriptions amounting to £97 17s, and that the expenditure had been £199 2s. 5d, leaving a balance of £10 2s. 9d. He regretted to say that during the year the Easter receipts had fallen off nearly £6, which was to be expected owing to the fine weather, and the subscription account had been reduced by £9 5s, principally in annual subscribers. He would like to draw attention to the fact that either more annual subscribers or more members should be introduced for the purpose of keeping up the funds of the Society.

Rev. Dr. Hamilton, in moving the adoption of the Report, said there was nothing very outstanding in the history of the Society during the year. The report was a record of plain, hard good work done in the interests of the objects for which the organisation was founded many years ago, and it was pleasant to them all to find that it continued to prosper. That was the second year during which Professor Symington had presided over the Society, and it was a matter of satisfaction to them all—and he

was sure a matter of surprise to no one who knew him—to discover that during those years it had not only held its ground, but had increased in prosperity and usefulness. He only hoped the president would be s :cceeded by another who would maintain the traditions of the society as honourably as he had done, or it would be still better if for a third year he could be prevailed upon to succeed himself. The Natural History Society occupied in his opinion a very useful place in Belfast. It would be a pity if they had no such organisation to be a rallying place for those who were interested in the subjects which that Society sought to look after, and it would be a still greater pity if the scientific worthies whose portraits hung on the walls of that building, who were the pioneers of their local scientific research—men like William Thompson and Robert Patterson—had no successors in these days when Belfast had reached a height of prosperity of which they in their day little dreamed. Even if the Society did almost no work it would be a good thing to have it there for these reasons, and at the same time for this additional reason—to hold up the torch of science before the inhabitants of their City, and to keep them in continual mind that men had something else to live for than the making of money.

During the past winter many useful papers have been read, and many important discussions had been held, and he had no doubt a great deal of valuable information had been diffused. The Society's collections in zoology, geology, palæontology, and archæology were an honour to Belfast, and ought to be more generally availed of than unfortunately they were. They were exceedingly valuable, and they would be poorer without them. They had a small balance to carry forward, and he hoped the public would not forget the appeal Mr. Horner had made for additional help. The only thing they required was a little more money. The Society was pursuing the even tenour of its way successfully and creditably, and he hoped it would long continue in Belfast, maintaining the honourable traditions of bye-gone days.

Mr. William Gray, in seconding the motion, said he had a great

respect for the Society, and he joined Dr. Hamilton in hoping that it would maintain its position for many years to come. It would be a disgrace to the City if it was not properly supported and enabled to continue its good work. There was a field open to the Society independent of making a collection in which they had been so successful up to the present, and now the time had come when it might be judicious to separate the two interests—Natural History Society proper and the collection. He did not think that with all the surroundings the Society could be expected to maintain efficiently the collection of which they had now charge, and there should be some effort on the part of the public outside to come in and relieve them to some extent of that responsibility.

Mr. John H. Davies, in supporting, said it might be of interest to mention that when recently on a visit to Kew he met there some distinguished botanists, one of them being his old friend Mr. J. G. Baker, F.R.S., and the latter informed him that the high standing of Mr. S. A. Stewart—who was so well known to them all—as a systematic botanist, and the value of the wide service he had rendered to the knowledge of Irish Botany, were fully recognised. When his name was brought before the Linnæan Society for election for the distinction of associate the proposal was received with the utmost cordiality and approval and it was considered that the name of no one more worthy of the honour could have been submitted. He thought it would be gratifying to Mr. Stewart's many friends in Belfast to know that.

The resolution was carried.

On the motion of Mr. W. Gray, seconded by Mr. Nevin H. Foster, the five retiring members of the Council were re-elected—Sir James Henderson, and Messrs. John Brown, S. F. Milligan, R. Patterson, and W. Swanston.

Sir James Henderson, in moving a vote of thanks to the chairman, said he wished to endorse all that the President of Queen's College had said regarding Professor Symington. They were all so pleased with the way in which he had assisted in

carrying on the work of the Society during the past year that, though they could not forestall what might take place at the Council meeting, they would be glad if he would consent to fill the office for a third year. Personally he thought no man was more entitled to a position of that kind than Professor Symington, and he was very pleased indeed to see him in the chair.

Mr. George Kidd seconded the motion, and it was heartily passed.

The Chairman said he was exceedingly obliged for the manner in which they had shown their appreciation of any small services he had been able to render to the Society. It had been a matter of extreme regret to himself that it had not been possible for him to devote more time to the general interests of the organisation, but his other duties kept him busy, and he had not very abundant leisure for outside work. At the same time he thought it was the duty of himself and of all persons occupying similar positions to do everything they could to maintain that Society. It seemed to him, as had already been stated by the President of Queen's College and Mr. Gray, that it would be a disgrace to a city of the size and importance of Belfast if it could not support a society of that character. In the first place, they started with very high traditions. The Society had, he believed, been in existence for more than eighty years, and for a very considerable time it had possessed an extremely valuable collection of objects illustrating the zoology, botany, geology, and archæology of that district.

Then it had enabled the workers in any or all of those branches of knowledge to bring their views before the members and the public generally. They also possessed a very valuable library. It was well known that while text-books of science very soon lost their value, the "proceedings" of learned societes in many cases increased in value as time went on, and it was very difficult to get a complete set of some important journals of that kind. They had in their library very valuable "Proceedings," extending over long periods. It would be a shame if the Society could not find in Belfast sufficient persons interested in the subject to maintain it

and to increase its reputation. Perhaps he might be pardoned for referring to various observations that appeared in the newspapers in the spring of this year with regard to the fate—not of the Society he was glad to say—but of its museum. He thought it should be clearly understood that the gentlemen who wrote to the newspapers did so on their own responsibility, and that they had not any special authority from the Council to express any views on that very debatable subject. He occupied the same position—he had no authority from the Council to express any opinion—but they must admit that they were surrounded now by altered circumstances from those which attended the earlier work of the Society. The city—he was not quite certain from what reason, whether from an innate love of the subject or in order to carry out some Act of Parliament—had undertaken to do the work that that Society did to some extent. He was thoroughly in sympathy with the idea of the city undertaking work of that kind. There was no doubt there were many advantages connected with the maintenance of museums either by Government or municipal authorities. At the same time, there were undoubtedly advantages associated with the direction of a museum by persons who had evinced a personal interest in the subject. He presumed that none of the members of the Corporation were elected for their knowledge of archæology or any of the sciences with which that Society was specially identified, though they were perhaps quite qualified to undertake that work. Speaking for himself, it would be with some reluctance, though it might be necessary, that he would see an extremely interesting and valuable collection passing out of the keeping of those specially interested in the subject. Then he would like, with reference to the general affairs of the Society, to say that it seemed to him that it would be a calamity for the organisation to part with its building. Some people thought that a Society like that should dispense not only with its museum, but also with its building, and trust to charity to find the members occasional accommodation for their meetings. He believed it was extremely important to the healthy life of the Society and for the

cultivation of the subjects in which they were interested that they should have a building of their own. Whatever might be the fate of their museum, it was essential that for the continued success of that Society a larger number of their citizens should take a more active interest in the organisation. Fifty years ago there were probably a larger number interested in the Society than at the present time and it said very little for their advance in civilisation and their improved methods of education if a society of that kind was as successful half a century ago as it was to-day. They ought to have a very much larger membership and to be engaged very much more actively in the work of the Society. He trusted all the members present would do their best to induce others to join. Whatever might be in store in the future, they had in the meantime to keep the Society going and to add to their collection, as well as to preserve the specimens they had, and they could not do that unless they were adequately supported. He had felt that he should be relieved of the duties of president, but if it was the wish of the Council and the Society generally that he should continue in office for another year he would be very happy to do his best for them.

The Proceedings then terminated.

A meeting of the Council was subsequently held, with the President of the Queen's College (Rev. Dr. Hamilton) in the chair.

On the motion of the Chairman, seconded by Sir James Henderson, Professor Symington was unanimously re-elected President for the ensuing year, and he kindly consented to accept the position.

The other office-bearers appointed were—Vice-Presidents, the President of Queen's College (Rev. Dr. Hamilton), Sir James Henderson, M.A., D.L. ; Sir R. Lloyd Patterson, D.L., F.L.S., and Mr. W. Swanston, F.G.S. ; Honorary Treasurer, Mr. John Horner ; Honorary Librarian, Mr. John H. Davies ; Honorary Secretary, Mr. Robert M. Young, B.A., J.P., M.R.I.A.

EDUCATIONAL ENDOWMENTS (IRELAND) ACT, 1885, 48 & 49 Vict., ch. 78.

The Account of the Council of the Belfast Natural History and Philosophical Society for the year ended 30th April, 1905.

Dr. | Cr.

CHARGE.

To Balance as per last Account		£15 3 3
,, Subscriptions		97 17 0
,, Dividends		17 2 5
,, Rents		29 18 0
,, Sales		3 8 0
,, Miscellaneous Receipts, viz:—		
Easter Receipts	£13 16 1	
Admission Fees	21 0 8	
Birds Sold	10 19 9	
		45 16 6
Total		£209 5 2

DISCHARGE.

By Amount of Payments under the following headings:—		
Maintenance of Premises, &c.	£17 1 2	
Rent and Taxes, &c.	28 3 10	
Salaries	93 16 4	
		139 1 4
,, Other Payments, viz.:—		
Printing and Stationery	8 2 6	
Advertising	13 7 6	
Postage and Carriage	3 6 0	
Fuel and Gas	16 5 7	
Audit Fees	2 2 0	
Insurance	6 12 0	
Hire of Hall	3 3 0	
Hire of Lanterns	1 18 6	
Easter Expenses	5 4 0	
		60 1 1
Total Payment		199 2 5
,, Balance in favour of this Account as on the 30th April, 1905		10 2 9
Total		£209 5 2

N.B.—Besides the above Balance there is a sum of £400 standing to the credit of this Account in the York Street Flax Spinning Co., Ltd, 4½ per cent. Debenture Stock.

We certify that the above is a true Account.

ROBERT M. YOUNG, Governor.
JOHN HORNER, Accounting Officer.

Dated this 5th day of June, 1905.

I certify that the foregoing Account is correct.

J F. MAYNE, Auditor.
9th day of June, 1905.

DONATIONS TO THE MUSEUM, 1904-1905.

From Mr. W. Seton Karr, M.P.

Thirty-three quartzite implements from Cuddapah, India.

From Mr. William Parr.

An ancient Greek coin found near Ligoniel, Belfast.

From Rev. W. C. Cunningham, Ballyrashane.

A beggar's badge of Dunluce.

From Mr. John Brown, F.R.S.

A specimen of the shell of *Tellina balthica* found, sub fossil, in esker gravels, near Dunmurry.

From Mr. Joseph Wright, F.G.S.

A microscope slide of a spicule of Synapta, a rare *Holothurian* from Lias clay at Gloucester, England.

From Mr. Thomas Nolan Murray, Hon. Sec. Ulster Amateur Photographic Society.

A photograph of the gigantic plant, *Gunnera manicata*, which is growing at Narrowater, Co. Down.

From Rev. Canon Bristow.

Thirty-six cameos and two agates.

From Mr. J. H. MacIlwaine.

A tomtit's nest and eggs found in the heart of a large tree when sawn open.

From Mr. Quinton Dunlop.

Letters patent, dated 1869, and massive seal attached thereto.

From Mr. W. Guiney.

A cast of the shell of a fossil Pecten, from Malta.

ADDITIONS TO THE LIBRARY, 1st MAY, 1904, TILL 1st MAY, 1905.

ADELAIDE. — Transactions of the Royal Society of South Australia. Vol. 28, 1904. *The Society.*

BASEL.—Verhandlungen der Naturforschenden Gesellschaft in Basel. Vol. 15, part 3, and vol. 17, 1904. *The Society.*

BELFAST.—Report and Proceedings of the Belfast Naturalists' Field Club. Ser. 2, vol. 5, part 3, 1904. *The Society.*

BERGEN.—Bergens Museum Aarsberetning for 1903 and 1904. Aarbog, parts, 1—3, 1904. Also Account of the Crustacea of Norway, vol. 5, parts 3—6, 1904, and parts 7 and 8, 1905. *The Director of the Museum.*

BIRMINGHAM.—Records of Meteorological Observations for 1904. *Birmingham and Midland Institute.*

BOLOGNA.—Rendiconto della R. Accademia delle Scienze. New ser., vol. 4, 1904. *The Academy.*

BOULDER.—University of Colorado College Studies. Vol. 2, Nos. 1—3, 1904. *The University.*

BRESLAU.—Zeitschrift für Entomologie vom Verein für Sclessiche Insektenkunde. New ser. part 29, 1904. *The Society.*

BRIGHTON.—Abstract of Papers and Annual Report of Brighton and Hove Natural History and Philosophical Society, 1904. *The Society.*

BROOKLYN.—Memoirs of Art and Archæology. Vol. 1, Nos. 1 and 2, 1902, and No. 4, 1904 : also Memoirs of Natural Sciences. Vol. 1, No. 1, 1904. *Brooklyn Institute.*

BRUSSELS.—Bulletin de la Société Royale de Botanique de Belgique. Vol. 41, part 3, 1904.

The Society.

" Annales de la Sociétié Entomologique de Belgique. Vol. 47, 1903, and 48, 1904. *The Society.*

" Annales de la Sociétié Royale Zoologique et Malacologique de Belgique. Vol. 38, 1903.

The Society.

BUENOS AYRES.—Anales del Museo Nacional de Buenos Aires. Ser. 3, vol. 2, 1903. *The Director.*

CALCUTTA.—Memoirs of the Geological Survey of India. Vol. 32, part 4, 1904, vol. 35, part 3, 1904, and vol. 36, part 1, 1904. Palæontologia Indica, ser. 15, vol. 4 (one part only), 1903. Records of the Geological Survey of India. Vol. 31, parts 1—4, 1904, and vol. 32, part 1, 1905.

The Director.

CAMBRIDGE.—Proceedings of the Cambridge Philosophical Society. Vol. 12, part 6, 1904, and vol. 13, part 1, 1905.

The Society.

CAMBRIDGE, MASS.—Bulletin of the Museum of Comparative Anatomy. Vol. 39, No. 9, 1904; vol. 43, Nos. 2 and 3, 1904; vol. 44, 1904; vol. 45, Nos. 2—4, 1904, and vol. 46, Nos. 1 and 2, 1904.

The Keeper of the Museum.

CARDIFF.—Transactions of the Cardiff Naturalists' Society. Vol. 36, 1903. *The Society.*

CHRISTIANIA.—Forhandlingar i Videnskaps-Selskabet i Christiania, 1903. Den Norske Sindssygelovgivning Forelesninger, 1901.

Royal Norske Frederiks University.

COLORADO SPRINGS.—Colorado College Studies. Vol. 12, Nos. 15—17, 1904.

Colorado College Scientific Society.

DANTZIC.—Schriften der Naturforschenden Gesellschaft in Danzig. New Series, vol. 11, parts 1 and 2, 1904; also Library Catalogue, 1904. *The Society.*

DUBLIN.—Memoirs of the Geological Survey—the Geology of the country around Belfast, 1904. *The Survey.*

EDINBURGH.—Transactions and Proceedings of the Botanical Society of Edinburgh. Vol. 22, parts 1, 1901, 2, 1903, 3, 1904, and part 4, 1905. *The Society.*

" Proceedings of the Royal Physical Society. Vol. 15, No. 2, 1904; vol. 16, No. 1, 1904, and No. 2, 1905. *The Society.*

EMDEN.—Jahresbericht der Naturforschenden Gesellschaft in Emden, 1904. *The Society.*

GENOA.—Rivista Ligure. Vol. 26, fasc. 2—6, 1904, and vol. 27, fasc. 1, 1905. *Societa Letture e Conversazione Scientifiche.*

GLASGOW.—Transactions of the Natural History Society of Glasgow. New ser., vol. 6, part 3, 1905.

" Proceedings of the Royal Philosophical Society of Glasgow. Vol. 35, 1904. *The Society.*

GORLITZ.—Abhandlungen der Naturforschenden Gesellschaft zu Gorlitz. Vol. 24, 1904. *The Society.*

IGLO.—Jahrbuch des Ungarischen Karpathen Vereines, 31st year, 1904. *The Society.*

INDIANOPOLIS—Proceedings of the Indiana Academy of Sciences. Volumes for 1902 and 1903. *The Academy.*

KHARKOW.—Transactions of the Society for Physico Chimiques of Kharkow University, No. 31, with two Supplements, 1903. *The Society.*

KIEW.—Memoirs of the Society of Naturalists of Kieff. Vol. 18, 1904, and vol. 19, 1905. *The Society.*

LAUSANNE.—Bulletin de la Société Vaudoise des Sciences Naturelles. Vol. 40, Nos. 147—151, 1904. *The Society.*

LAWRENCE.—Bulletin of the University of Kansas. Vol. 2 No. 7 1901, and vol. 4, Nos. 6 and 8, 1903.
The University.

LEIPSIC.—Mitteilungen des Vereins für Erdkunde zu Leipzig. Part 1, 1903. *The Society.*

„ Sitzungsberichte der Naturforschenden Gesellschaft zu Leipzig. 28th and 29th years, 1901 and 1902.
The Society.

LIMA.—Boletin del Cuerpo de Ingenieros de Minas del Peru. Nos. 4 and 5, 1903, 6—18, 1904, and No. 19, 1905. *The Director.*

LONDON.—Report of the Southport Meeting of the British Association, 1903. *The Association.*

„ Memoirs of the Royal Astronomical Society. Vol. 54, and 5 appendices, 1901-4, vol. 55, and appendix, 1904. *The Society.*

„ Quarterly Journal of the Geological Society of London. Vol. 60, Nos. 237—240, 1904, and vol. 61, No. 241, 1905 ; also Geological Literature for 1903, and List of Fellows, 1904. *The Society.*

„ Journal of the Royal Microscopical Society, parts 3—6, 1904, and parts 1 and 2, 1905. *The Society.*

„ Transactions of the Zoological Society of London. Vol. 17, part 3, 1904. Proceedings, vol. 1, parts 1 and 2, 1904, and vol. 2, part 1, 1904, also List of Fellows for 1904. *The Society.*

„ Guide to the Fossil Mammals and Birds in the British Museum . 8th ed., 1904. Guide to the Gallery of Birds, 1905, and pamphlets on Diptera and Blood Sucking Flies.
The Trustees of the British Museum.

MADISON.—Transactions of the Wisconsin Academy of Sciences, Arts, and Letters. Vol. 13, part 2, 1902, and vol. 14, part 1, 1903. *The Academy.*

MADISON.—Bulletin of Wisconsin Geological and Natural History Survey. Nos. 11 and 12, 1903.
The Commissioners of the Survey.

MADRAS.—Bulletin of the Madras Government Museum. Vol. 5, No. 1, 1903, and Administration Report, 1904.
The Superintendent.

MANCHESTER.—Journal of Manchester Geographical Society. Vol. 19, Nos. 4—12, 1903, and vol. 20, Nos. 1—3, 1904. *The Society.*

,, Transactions of Manchester Geological and Mining Society. Vol. 28, Nos. 13—15, 1904.
The Society.

MARSEILLES.—Annales de la Faculte des Sciences de Marseille. Vol. 14, 1904. *The Librarian.*

MELBOURNE.—Proceedings of the Royal Society of Victoria New ser., vol. 17, part 1, 1904, and part 2, 1905.
The Society.

MEXICO.—Anuario del Observatorio Astronomico de Tacubaya. Ano 25, 1904. Boletin Mensual del Observatorio Meteorologico de Mexico. No. 3 and Nos. 6—8, 1902. *The Director.*

,, Parergones del Instituto Geologico de Mexico. Vol. 1, Nos. 2—6, 1904. *The Institute.*

MILWAUKEE.—Twenty-second Annual Report of the Trustees of Milwaukee Public Museum, 1904.
The Trustees.

MISSOULA.—Bulletin of the University of Montana. Nos. 21—23, 1904, and Biological Series, No. 5, 1903, and No. 7, 1904. *The University.*

MONTEVIDEO.—Anales del Museo Nacional de Montevideo. Ser. 2, part 1, 1904. Section Historico Filosofica, Vol. 1, 1904. *The Director.*

MORELIA.—Relacion de los Ceremonias y Ritos y Poblacion y Gobernacion de los Indios de la Provincia de Mechuacan. ———

MOSCOW.—Bulletin of the Imperial Society of Naturalists of Moscow. No. 4, 1903, and Nos. 2—4, 1904.

The Society.

NANTES.—Bulletin de la Société des Sciences Naturelles de l'Ouest de la France. Ser. 2, vol. 3, Nos. 3 and 4, 1903, and vol. 4, Nos. 1 and 2, 1904.

The Society.

NEW YORK.—Annals of the New York Academy of Sciences. Vol. 14, part 4, and vol. 15, parts 2 and 3, 1904.

The Academy.

" Bulletin of the American Geographical Society. Vol. 36, Nos. 3—12, 1904, and vol. 37, Nos. 1 and 3, 1905. *The Society.*

ODESSA.—Memoirs of the Society of Naturalists of New Russia. Vol. 25, part 1, 1903, part 2, 1904, vol. 26, 1904, and vol. 27, 1905. *The Society.*

OPORTO.—Annaes de Sciencias Naturaes. Vol. 8, 1903.

Senor Augusto Nobre.

OTTAWA.—Contributions to Canadian Palæontology, part 3, 1904. Canadian Birds, part 3, 1904, and also Dictionary of Altitudes in Canada, 1903.

The Director of the Canadian Geological and Natural History Survey.

PADUA.—Atti della Accademia Scientifica Veneto-Trentina-Istriana. New ser., Anno 1, fasc. 1 and 2, 1904.

The Academy.

PHILADELPHIA.—Proceedings of the Philadelphia Academy of Natural Sciences. Vols. 65 and 66, 1904.

The Academy.

" Proceedings of the American Philosophical Society. Vol. 40, No. 167, 1901, and vol. 43, Nos. 175 and 176, 1904. *The Society.*

PISA.—Atti della Società Toscana di Scienze Naturali, Processa Verbali. Vol. 14, Nos. 3—5, 1904.

The Society.

RENNES.—Travaux Scientifiques de l'Universite de Rennes. Vol. 2, 1903. *The University.*

RIO DE JANEIRO.—Archivos do Museo Nacional do Rio de Janeiro. Vol. 10, 1899, vol. 11, 1901, and vol. 12, 1902. *The Director of the Museum.*

ROME.—Journal of the British and American Archæological Society of Rome. Vol. 3, No. 6, 1904. *The Society.*

„ Atti della Reale Accademia dei Lincei. Ser. 5, vol. 13, semestre 1, fasc. 7—12, 1904; semestre 2, fasc. 1—12, 1904; vol. 14, semestre 1, fasc. 1—7, 1905, and Rendiconto Adunanza Solenne, 5 June, 1904. *The Academy.*

, Bollettino della Società Zoologico Italiana. Vol. 5, fasc. 1—8, 1904, and vol. 6, fasc. 1—3, 1905. *The Society.*

ST. LOUIS.—Fifteenth Annual Report of Missouri Botanical Garden, 1904. *The Director.*

STAVANGER.—Stavanger Museums Aarshefte. Fourteenth year, 1904. *The Museum Trustees.*

STIRLING.—Transactions of Stirling Natural History and Archæological Society, 1904. *The Society.*

STOCKHOLM.—Kungl Svenska Vetenskaps Akademiens Handlingar. Vol. 37, Nos. 3 and 4, 1903, and Nos. 7 and 8, 1904; vol. 38, Nos. 1—5, 1904. Arkiv for Botanik, vol. 1, part 4; vol. 2, parts 1—4, and vol. 3, parts 1—4, 1904. Also Arkiv for Matematik, Astronomi, och Fysick, vol. 1, parts 3 and 4, 1904. Arkiv for Mineralologi, Kemi, och Geologi, vol. 1, parts 3 and 4, 1904. Arkiv for Zoologi, vol. 1, parts 3 and 4, 1904, and vol. 2, parts 1 and 2, 1904, and Arsbok, for 1904. Also Les Prix Nobel, 1901-1904. *The Academy.*

SYDNEY.—Science of Man. Vol. 7, Nos. 2—7, 1904. *The Anthropological Society of Australasia.*

TOKYO.—Mittielungen der Deutschen Gesellschaft für Natur und Heilkunde Ostasien. Vol. 10, part, 1, and Supplement, 1904. *The Society.*

TORONTO.—Transactions of the Canadian Institute. Vol. 7, part 3, and Proceedings, vol. 11, 1904. *The Institute.*

VIENNA.—Verhandlungen der Kaiserlich Koniglichen Geologischen Reichsanstalt. Nos. 5—18, 1904, and Nos. 1 and 2, 1905. *The Society.*

,, Verhandlungen der Kaiserlich Koniglichen Zoologisch-Botanischen Gesellschaft. Vol. 44, 1904. *The Society.*

WASHINGTON.—Year Book of the United States Department of Agriculture, 1903.

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,, Twentieth Annual Report of the Bureau of American Ethnology, 1903. *The Director of the Bureau.*

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Report and Proceedings

OF THE

BELFAST

Natural History and Philosophical Society

FOR THE

SESSION 1905-1906.

BELFAST:
PRINTED BY MAYNE & BOYD, 2 CORPORATION STREET.
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Any further informatiou required may be obtained from the Honorary Secretary.

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NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

SESSION 1905–6.

7th November, 1905.

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BELFAST CIVIC UNDERTAKINGS.

BY ARTHUR H. MUIR, C.A.

(*Abstract*).

As the population of any town grows, the interdependence of its inhabitants increases. The mere fact of a large number of persons living within a comparatively small area necessitates a great number of activities not previously required, *e.g.* Scheme of Drainage and Sewage Disposal, Public Health Precautions, Street Lighting, Policing, Public Parks, &c., and renders possible a number of other activities mutually beneficial, but impossible without a centre of population, *e.g.* Tramways, Public Baths, Gas Manufacture, Electric Light and Power Manufacture, Markets, Free Libraries, and Cheap Concerts for the people.

Under the title of "Belfast Civic Undertakings" are included all undertakings for the good of the Community which are controlled by Local Authorities. These consist of the undertakings of

1. Belfast City Corporation.
2. Belfast Harbour Commissioners.
3. Belfast City and District Water Commissioners.
4. Belfast Poor Law Guardians.

1. Belfast City Corporation.—For the purposes of Municipal Government the City is divided into fifteen wards, which are of various sizes, and in which the number of voters ranges from 2,400 in Smithfield Ward to 5,713 in Pottinger Ward. Each Ward is represented on the City Council by three Councillors and one Alderman, thus making a Council of sixty.

Most of the great English Cities have an Official so far unknown in Belfast, viz: an Elective Auditor. It will be said that the Corporation Accounts are audited by the Local Government Board Auditor, but practically he confines himself to the question as to whether the payments are properly authorised and are legally made. The functions of the Elective Auditor are different. He acts for the ratepayers. He is more particularly concerned with the question of whether the payments are wisely made, and whether the various departments are being worked on an economical and businesslike basis. He reports to the ratepayers on the undertakings of the Corporation from a business point of view, and brings the light of his business experience to the gloomy shades of overstaffed offices, and expensively managed public departments. He also draws up reports on the financial aspects of the aspirations of committees anxious to develop fresh schemes at the expense of the ratepayers, and endeavours to keep the citizens posted up in the true facts of the various matters in hand. The office should be created in Belfast.

The Lecturer then gave descriptions of the following Undertakings: – Public Health, Upkeep of Monuments, Roads and Bridges, Maintenance of Order, Public Baths, Lodging House, Public Parks, Cemeteries, Free Libraries, Municipal Technical Institute, Fire Brigade, City Surveyor's Department—Planning of Streets, Supervision of Drainage and Sewage Disposal, Passing of Plans for New Buildings; Ulster Hall, Scavenging, Markets and Abattoir, Gasworks, Electric Light Station, Tramways.

Referring to the Planning of new streets, the cities of the United Kingdom lack a power which is very necessary, namely, the power of planning out the lines on which the City shall develop,

and of compelling all property owners both inside and immediately outside the city boundary to comply with the plan of development. Straight wide streets and roads are laid down on the plan where they do not at present exist. Certain areas are reserved for dwelling-houses, and certain other areas for factories and workshops. The result is a healthy development along the lines of a scheme laid down by the Municipality, under the advice of the most skilled advisers. No landowner, in order to make the most of his little patch, may run awkward streets across his property contrary to the general scheme, nor may he put up a different class of property from that laid down. No fabulous sums are required to be paid for street improvements, or for the pulling down of buildings put up in awkward places. Sooner or later such powers must be obtained.

2. Belfast Harbour Commissioners.—In 1785 an Act was passed appointing a separate Corporation to look after the interests of the Port of Belfast. For the previous forty years the control had been exercised by the equivalent of the modern Town Council. The Commissioners are twenty-one in number, and are elected for a period of three years.

3. Belfast City and District Water Commissioners.—Water is an absolute essential for cities, and for large centres an abundant supply must be procured if the city is to grow either in population or commercial importance. The necessity for an ample water supply has, therefore, caused many cities to spend enormous sums on colossal schemes. In fact the greater the city, as a rule, the more costly the water supply.

The Water Commissioners number fifteen, one from each Ward, and are elected for a period of three years. They were incor porated in 1840, when they took over the water supply as it then existed from the Belfast Charitable Society.

The Lecturer referred to the Water Supply in 1840. Woodburn Reservoirs, seven in number, storing 1515 million gallons, and capable of giving 8 million gallons per day. Stoneyford Reservoirs, two in number, storing 820 million gallons, and capable of

giving 4 million gallons per day. Filtration beds, Oldpark and Antrim Road Works, Pumping Station, Ligoniel Storage Tank. Mourne Scheme, when completed, consisting of two reservoirs, capable of storing 3750 million gallons, and of giving 30 million gallons per day through a conduit 35 miles long.

4. Belfast Poor-Law Guardians.—This Board is one elected from the fifteen Wards of the City, together with nine other adjoining districts, making twenty-four divisions in all, each represented by two Guardians. In addition to these forty-eight Guardians six are co-opted.

A very common impression is that the inhabitants of the Workhouse consist of a large number of men who won't work, and who are kept in comparative comfort and ease at the expense of the community. As a matter of fact out of the 3,489 inmates on the night of 3rd November, 1905, only 101 were of this class. The balance was made up of 1,437 infirm old men and women, 1,544 people sick in the Hospital Wards, 275 children, and 132 mothers. The small percentage of healthy out-of-works, who find themselves there, do not get an easy time of it, and usually do far more work inside the Workhouse for nothing, than they do outside for pay. There is, unfortunately, a marked and steady increase in the number of old men, who have been working constantly all their lives until a short time previous to admission. It is thought that the Workmen's Compensation and Employers' Liability Acts have been a factor in this.

A marked feature of all cities during the past 25 years has been the enormous increase in Local Indebtedness. Belfast forms no exception, and Diagram No. 1 gives some idea of the increase during the last 15 years. Along the foot of the Diagram is measured a number of equal spaces, each representing one year, while up the side each space represents one quarter of a million pounds sterling. By placing a point in each year opposite the amount of debt in that year, a series of points result which, when joined by a line, give the best representation of the increase or decrease of debt over a series of years. It will be noticed that the debt of the

DIAGRAM No. I.

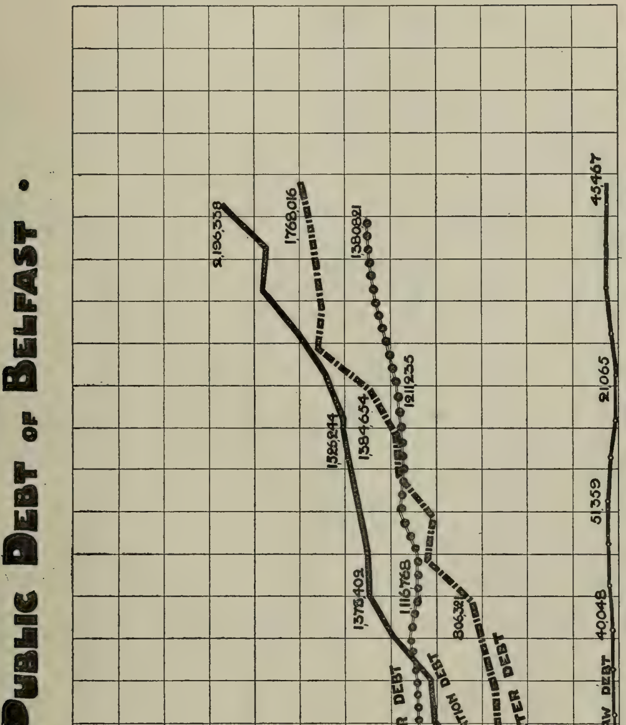
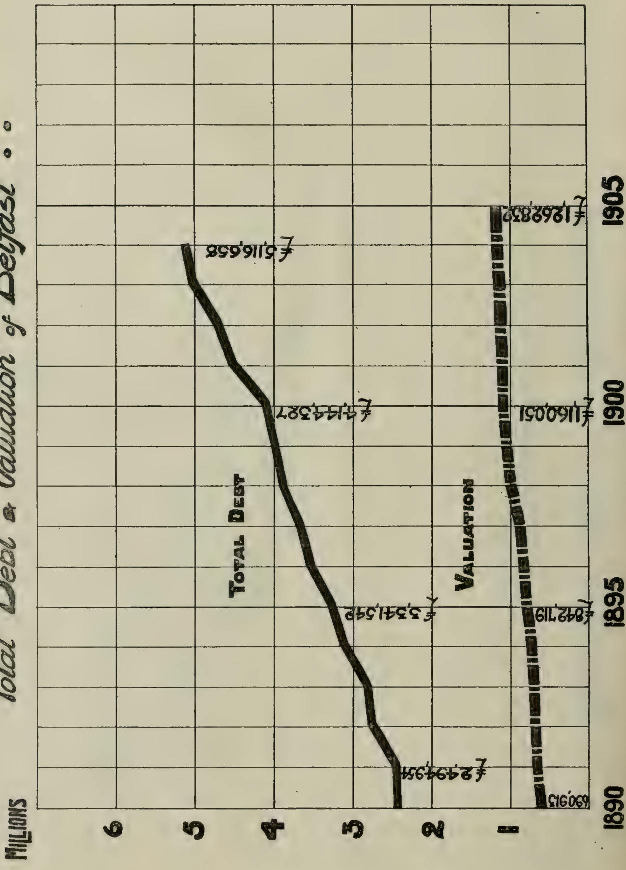

PUBLIC DEBT OF BELFAST
MILLIONS £ 3
2½
2
1½
1
½
1890 '91 '92 '93 '94 1895 '96 '97 '98 '99 1900 '01 '02 '03 04 1905 '06 '07 '08 '09
HARBOUR DEBT
CORPORATION DEBT
WATER DEBT
POOR LAW DEBT
1015990
871235
577128
8761
1116768
1378402
806321
40048
51359
1526244
1584654
1911235
21065
2,196358
1768016
1380821
45467

DIAGRAM NO. 2.

Total Debt & Valuation of Belfast



Poor-Law Guardians fell considerably between the years 1898 and 1900, owing to the Public Health Department being taken over by the Corporation, but that it has risen since owing to the Whiteabbey Sanatorium being acquired.

The Water Debt shows a very rapid rise up to 1901 owing to the Mourne Scheme, but since then it has not been going up so much, as that scheme is not going on to completion immediately.

The Harbour Debt has gone up steadily, but not rapidly. The Debt of the Corporation has gone up both steadily and rapidly on the whole, and will show a great leap upwards when the Tramway Debt of £1,000,000 is included. And as the Corporation takes over other undertakings that debt will probably go on increasing as in other cities. With reference to the contention that the assets of the various bodies are of far greater value than the existing debts, it should be pointed out that these assets are not liquid, and that most of the debts have to be repaid in a limited number of years. In some cases this is provided for out of the revenues of these assets, but in other cases it must come out of the rates.

Each step in Diagram No. 2 represents £1,000,000, and the line shows the total of the Debts, which were set out singly on the first chart. The responsibilities of the community have therefore increased from £2,473,114, in 1890, to £5,116,658 in 1904. The lower of the lines shows the increase in valuation of the city during the same period. The somewhat rapid rise of the valuation about the year 1898 is explained by the extended area of the city.

Diagram No. 3 shows the increase in the population of Belfast. The black columns represent the census years, while the light columns are interpolated from 1890 onwards to give a complete series from that year. The sudden rise from 1897 to 1898 is explained by the extending of the city boundary.

It is not fair to take the figures representing the increasing debt of a rapidly increasing city, without also taking into account the increased population. Diagram No. 4 shows the debt per head of population for the period from 1900, and is obtained

Diagram No. 3.

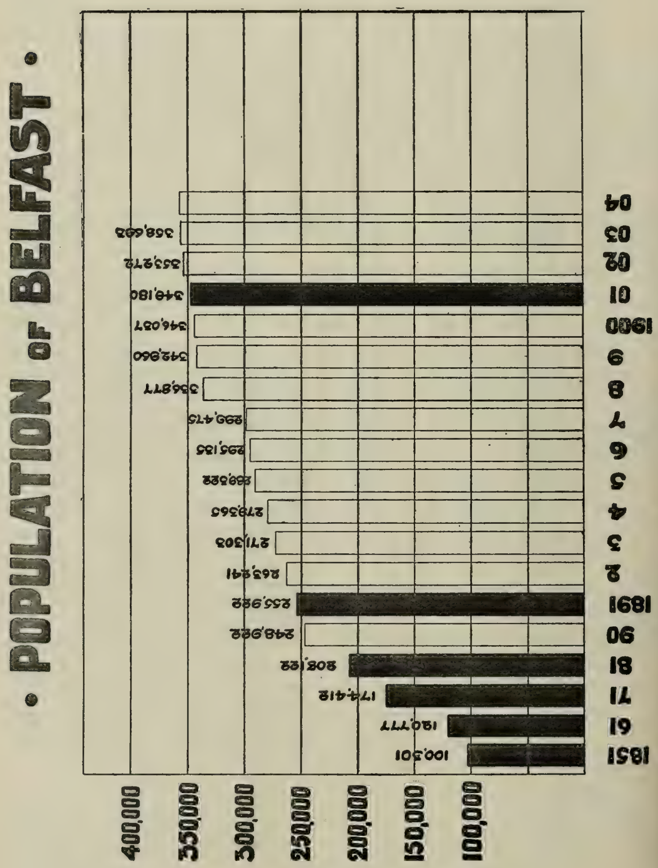
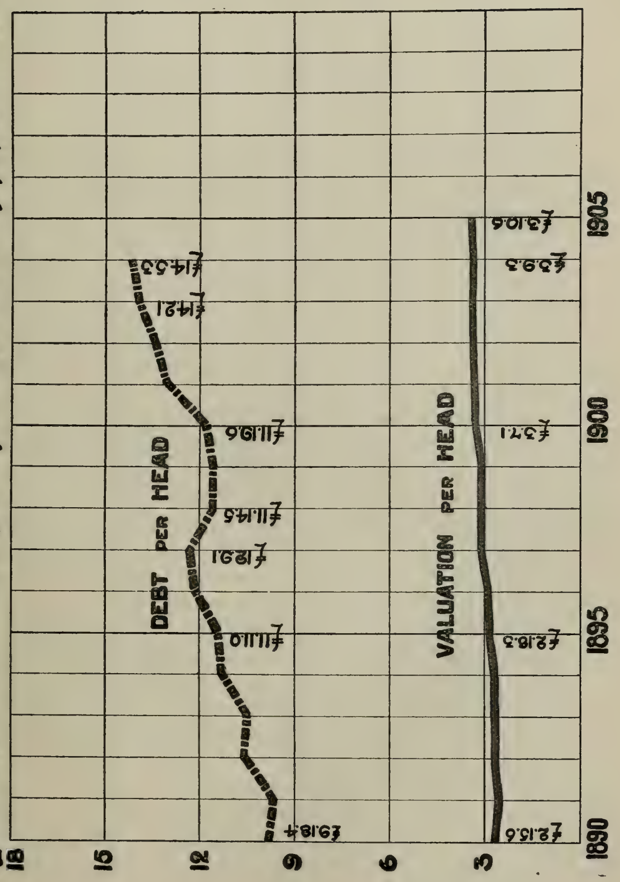

• POPULATION OF BELFAST •
400,000
350,000
300,000
250,000
200,000
150,000
100,000
1851
61
71
81
90
1891
2
3
4
5
6
7
8
9
1900
01
02
03
04
100,301
120,777
174,412
208,122
248,922
255,922
263,941
271,303
279,365
289,322
295,135
299,475
336,877
342,960
346,057
349,180
353,272
358,693

DIAGRAM No. 4.

Debt & Valuation of Belfast per head of population.



by dividing the population in each year into the total debt as given on second diagram. The drop in 1898 is caused by the debt having been divided by the population for that year, which was increased by the inhabitants of the added area.

Diagram No. 5 gives a view of the progress of taxation during the past 15 years.

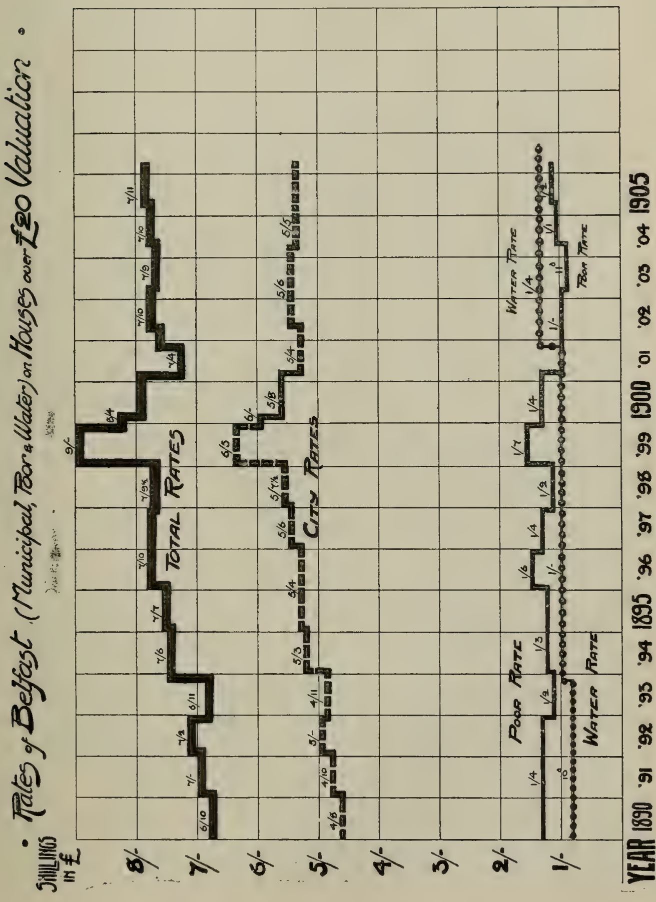
In any rapidly growing city the number of immigrants coming to take advantage of the positions offered must fill the municipality with many who take little or no interest in its public affairs. They are *in* it but not *of* it, and are content to leave all such matters in other hands. Now the tendency of such apathy is to permit public bodies to be run by interested cliques for purposes other than the good of the community. If, under such conditions, the personnel of the governing bodies depreciates, and administration is not so efficient as it should be, the citizens of course have themselves to blame.

A difficulty is always present which helps to make many voters apathetic as regards civic affairs, namely :—that they pay no direct taxes. It is true of course that in the long run, and on the average, the taxes levied on the properties in which they live come out of their pockets, but this is not apparent to many of them. The result is that frequently they demand expenditure on projects in the hope of an immediate benefit for which, however, they themselves have ultimately to pay in increased taxation.

Another instance of this tendency is the cry that because one Ward has something another Ward must get it also ; because one Ward has Public Baths another Ward must have it ; because one Ward has a Branch Library another must be provided in another Ward. Such a policy would build up a most serious burden on the ratepayers.

To load up our local authorities with a multiplicity of duties further increases the time which is required of the city's representatives. It makes it more and more of a tax upon those men who undertake those duties, and it tends to prevent the men who are most competent for the position from accepting office. The tendency is towards a decreasing efficiency in the representatives.

DIAGRAM No. 5.


Rates of Belfast (Municipal, Poor & Water) on Houses over £20 Valuation
SHILLINGS IN £
8/-
7/-
6/-
5/-
4/-
3/-
2/-
1/-
YEAR 1890 '91 '92 '93 '94 1895 '96 '97 '98 '99 1900 '01 '02 '03 '04 1905
TOTAL RATES
6/10 7/- 7/2 6/11 7/6 7/7 7/10 7/9½ 9/- 8/4 7/4 7/10 7/9 7/10 7/11
CITY RATES
4/8 4/10 5/- 4/11 5/3 5/4 5/6 5/7½ 6/3 6/- 5/8 5/4 5/6 5/5
POOR RATE
1/4 1/2 1/3 1/6 1/4 1/2 1/7 1/4 1/- 11 1/1 1/2
WATER RATE
10 1/- 1/4

The development of municipal trading also brings into existence a number of employees paid directly by the municipalities, with the temptation to use their vote on personal rather than on public grounds.

For many years the Belfast Conservative Association has been the most potent factor in our Municipal affairs, and the citizens are deeply indebted to this organisation for its efforts in putting forward good men, and returning so many in the face of the apathy of the great bulk of the citizens. It suffers, however, from the drawback common to all associations representing party politics, namely, that it cannot secure public confidence outside its own party, and this would be equally true if it were a Liberal Association.

But after all, political or religious opinions are largely irrelevant to efficiency in civic matters, and the danger of making party politics a motive for municipal elections is that every now and again men are bound to be put forward for the mere purpose of opposing the opposite party, without reference to their fitness for civic administration.

It should be the aim of the ratepayers to return the best men, be they Conservative, Liberal Unionist, or Radical, Protestant or Catholic.

The rise in the population of Belfast is not now as rapid as it was, and we have a more settled community. Such a condition is more conducive to the development of a high ideal of citizenship. We require to rouse the body of the people from their apathy regarding the duties and responsibilities of citizenship. An interest in civic affairs must be aroused, and a spirit of civic patriotism created. Our men of means and leisure must recognise that there is a duty which they owe to the community, and that they are called upon to lay their powers on the altar of the common good. It is no use criticising the City Council and howling anathemas at the members of our public Boards. It is ourselves as citizens who are at fault if anything is really wrong. All is in our own

hands. These beneficent agencies and public services are ours to make or to mar.

The object which must be set before us is a great one, and requires the assistance of every citizen. It is to make Belfast an ideal city. Knowledge of its activities must be disseminated. Love for its prosperity must be created. A sense of civic patriotism must be brought into being. Our aim should be to raise the tone of our local bodies to such a level that they shall be models to the other cities of the Kingdom. Then every citizen will be able, thinking of his part in the life spreading around the magnificent pile of his City Hall, to say with pride, and *justifiable* pride, "I am a citizen of no mean city."

Alderman King Kerr, in moving a vote of thanks to the Lecturer, said all present would go away with more information than they possessed before they entered the room, and also with a deeper sense of pride in their city. He thought the public, so far from criticising the corporators and other municipal governors, ought to criticise themselves. If they were not satisfied with the government of the city the fault was their own, for the people had the remedy in their own hands.

Mr. John Finnegan seconded the vote of thanks, which was passed by acclamation.

The Chairman, in conveying it to Mr. Muir, said Mr. Muir had treated his subject with great tact, and the Society would like to have some more papers on the same lines as those taken by the lecturer.

Mr. Muir suitably replied, and paid a tribute of praise to Mr. Hogg, who had taken the views which had added so much to the success of the lecture.

5th December 1905.

PROFESSOR JOHNSON SYMINGTON, M.D., F.R.S. F.R.S.E., President, in the Chair.

ON PREHISTORIC MAN IN SOUTHERN FRANCE

BY W. P. DE VISMES KANE, M.A., D.L., M.R.I.A

(Abstract.)

The lecturer first described the great limestone plateaux of Aquitaine, which are broken up by great cañons into separate units called Les Causses. He then showed a series of lantern slides representing the wonderful cliff scenery of the cañon of the river Tarn, down which he voyaged for 30 miles. The Causse of Gramat was then referred to, which is very similar in its appearance to the limestone plains of Galway or Clare, and likewise full of subterranean rivers and streams, but running at vast depths below the surface, and excavating caverns of enormous size and extent, the roofs of which in many cases have fallen in, and so have opened great chasms and gulfs in the flat levels, many of which have been explored by Monsr. Martel. Views of several of these abysses were given, some of them photographed by magnesium light. The barrenness of the plateaux of the higher levels abutting on the Cevennes was traced largely to the destitute condition of the peasantry, in consequence of the equal division among the children of the property of the father at his death, and the cutting of all timber to pay the debts, so that the whole country now lies bare to the sun in summer, and to the rain in winter, which washes away gradually the fertile soil into the fissures. The chalk plateaux were then described, which are the lowest in elevation, and most westerly, and the lecturer proceeded to

describe the caverns and rock shelters of the Department of Dordogne, chiefly dealing with those about the village of Les Eyzies. Here he described the rock shelters of Cro-Magnon, in which three human skeletons were exhumed from among the debris of a "kitchen midden," composed of the relics of reindeer, bison, and mammoth, which had formed the food of the men who lived at that period. Another human skeleton was also referred to, which lay in a similar heap of debris, in the position in which he was killed by the falling down of the cornice of rock overhead. Flint weapons and flakes found by the lecturer in the refuse heap in which his remains were discovered were exhibited, and were referred to the close of the mid quaternary, or more properly the beginning of the upper quaternary period. Other skeletons such as that found in similar conditions at Raymondeu were mentioned belonging to the same age, namely, the late quaternary. All these were shown to have in common a very high type of dolicocephalic cranium, and the method of interment and the personal ornaments to be similar. The eleven human skeletons found in the Mentone caves in the extreme south-east France were then alluded to, where also a red ochreous earth was used to cover the bodies, while the flint weapons found in their hands and the corresponding style of ornaments proved the age to be late quaternary. The skulls corresponded in shape with those of Cro-Magnon, and showed a high index, and the stature of the men of that period proved to be on an average above 6 feet. This race of men, the lecturer said, were the earliest racial type which could be certainly ascertained to belong to any particular prehistoric period; for the Engis skull, though found in a layer of debris in which mammoth remains existed, was also accompanied by a fragment of pottery, which left the question of age open. Similarly he was unable to accept the evidence as to age of the Neanderthal skull, which is usually referred to the mid quaternary epoch. Illustrations of the chief types of weapons and implements of flint and bone were then shown, and various fragments of deer's antlers, with carvings of extinct animals, were thrown on the screen, among which

cleverly executed outlines of elephants, mammoth, rein- and other deer, saïga antelope, bison and horses were shown. And lastly a description was given of cleverly executed outlines incised on the rough interior walls of caves at Les Eyzies, far away from the entrance, many of which were crusted over with a film of stalagmite, proving that they were not executed in modern times. This race of men contemporary with the age of the reindeer and mammoth in southern France were shown to be of a high type, both as regards the capacity and contour of their skulls, intelligence in ornament, and manufacture of implements from flint and ivory, so that one must look to the Tertiary period, long before the epochs of Southern European glaciation, for relics of any ancestors of the human race that approached the Simian type; though single specimens of debased shape were found both anciently as at Neanderthal, and in historical times as in the Peruvian tombs, and even in quite modern races.

On the motion of Mr. Garrett Nagle, seconded by Mr. Knabenshue, Mr. Kane was heartly thanked for his interesting and valuable paper.

4th January, 1906.

Sir James Henderson, A.M., D.L., Vice-President, in the chair

ULSTER SAYINGS AND FOLK-LORE.

By Professor Byers, M.A., M.D.

(*Abstract*).

In this lecture, which was a continuation of a contribution brought before the Society—"Sayings, Proverbs, and Humour of Ulster"—on December 1st, 1903, and since published, Professor Byers discussed first various sayings and folk-lore used in reference to the weather and the seasons. That the Ulsterman can, when provoked, be severe, ironical, and sarcastic, was fully established by a variety of expressions; various phrases employed by him in bargaining were given; and, finally, examples were brought forward to show that even in Ulster, where the native Celtic element has been much displaced by the English and Scotch settlements, that topsy-turvy method of expression known as a "bull" is just as prevalent as in any other part of Ireland, and that, curiously, it is sometimes met with among those, otherwise learned and cultivated, as well as amongst the uneducated. The Lecture appeared in a series of articles in the *Northern Whig*, and will, with additions, be published.

Mr. William Crawford, in moving a vote of thanks to Professor Byers, said his lecture was as interesting and full of amusement and charm as the lecture he gave on the same subject on a previous occasion, and he hoped he would find time to give them a third edition.

Mr. Adam Speers, in seconding the motion, said the lecture was by far the best he had ever listened to on that subject —a subject to which he had himself been giving a good deal of

attention for the past thirty or forty years. The lecture Professor Byers had given that night, added to what he had said before on that subject, would make a very interesting treatise, and he hoped such a book would be produced by the lecturer soon. Perhaps the best work done in the way of collecting a vocabulary of Ulster words and phrases had been done by a gentleman whom he saw present that night—he referred to Mr. W. H. Patterson—in the treatise he had produced for the English Dialect Society.

The resolution was passed by acclamation, and was appropriately conveyed by the Chairman.

Professor Byers, in responding, said he might perhaps on some future occasion take up the subject of "The Ulster Child: His Games and Amusements," which, he thought, would be an interesting topic to the members of the Society.

9th February, 1906.

Professor Symington, M.D., F.R.S., F.R.S.E., President, in the chair.

WITH THE BRITISH ASSOCIATION IN AFRICA,

By John Brown, F.R.S.

(Abstract).

To attempt to give in one evening anything more than a few salient impressions of a trip of 20,000 miles over land and sea would be impracticable. Quite the strongest impression remaining is that of the extraordinary cordiality and hospitality of our colonial cousins. Too much cannot be said for the careful forethought and organising power shown by the local stewards in their arrangements for entertaining a party of 376.

The members went out chiefly in two ships of the Union-Castle line, the Saxon and the Durham Castle. After the delightful voyage with its tropical seas, fishes, and birds, we had to awaken from the pleasant dreamy days on the ocean to land at Capetown. The members of the official party were hospitably entertained by the chief residents; the Hon. C. Dempers, a member of the Upper House of the Cape Parliament being "mine host."

Capetown is of course a quite old, settled, and flourishing city, set in most picturesque surroundings, within easy reach by driving, walking, or electric trams. The views from the summit of Table Mountain are very fine. A reception at the Royal Observatory was also interesting. The place was established by Royal charter in 1820. The site is not ideal, but it was the only available English possession at that time in the Southern Hemisphere. The gardens and botanical museums are most interesting, and the new City Hall a very fine building; in fact, all over South Africa one is struck by the size and excellence of the public halls available.

The opening half of the President's address was delivered here and sections met for three days.

On Saturday, 19th August, we sailed for Durban, a bright and busy, well-kept town, with a fine harbour, well filled with shipping. The streets are good, and there are electric trams, fare 3d. There are also rickshaws, drawn by natives; very fine men in fantastic dresses, very active, graceful, and full of antics. We were told they did not last long at this arduous work, partly on account of the damper climate near the sea. There is a sugar industry also a good locomotive works. Much of the retail trading appeared to be done by Hindus.

There is a beautiful suburb (the Berea). The vegetation in Natal is luxuriant, and the soil appears fertile. Tea, tobacco, sugar and maize are cultivated. Most delicious pine apples are sold at 2d. and 3d. each; they grow in drills like turnips.

Our next stay was Pietermaritzburg, another bright and pleasant town, near which, among the hills at Henly, a Kaffir dance was held in our honour by command of the Governor of the Colony, Sir H. M'Callum. The natives assembled to the number of 1,000 or more in war dresses of skins and beads, and with shields and poles, representing assegais. They saluted the Governor and suite, the salute being first a general hiss and then a crouching or "hunkering" down, and then rising to full height with a terrifying yell or howl. The dance was most strange. It was accompanied by a weird and monotonous chant, and the prevailing step was a stamping in unison with earth shaking power. The historians of the tribe marched back and forth, across the front, reciting the victories over their enemies. Occasionally a bevy of women would move across in crouching or fantastic attitudes. Some of them waving rolls of paper, which we imagined might be important documents, but which turned out to be bright coloured advertisements of somebody's patent pills.

After the dance came the marriage of a chief of the Inadi tribe to a lady who was to be his chief wife and mother of his principal heir. The ceremony began by dances of the bride's father,

the bridesmaids, and marriageable girls. The amount of obole or consideration given for the bride was then arranged. The bride was asked if she were willing, presents were exchanged, and the ceremony concluded with a dance, during which the bride had to run away and be recaptured. After the dancing, etc., a number of oxen were killed, cut up, roasted, and eaten with great gusto.

At Colenso which is merely a station and a few shops, a hotel and a Hindu temple, we visited the battlefield, a plain, with low hills to westward on the banks of the Tugela, on which the Boers were entrenched or sheltered in schances. There are still shrapnel bullets and pieces of shell scattered here. The bravery of our troops and the incompetence of their leader was here fully recognised. The more we heard of the story of Colenso and Spion Kop the more miserable and foolish it appeared. There were monuments commemorating the bravery of officers and men, notably one where Lieutenant Roberts fell when trying to recover the guns.

All along the railway to Ladysmith are soldiers' graves, sometimes two or three, sometimes scores, marked with crosses, and protected with white palings. Those graves are kept in order by the Loyal Women's League of South Africa.

Ladysmith is said to be unhealthy since the war, owing to the germs of enteric fever left in the water, and is chiefly interesting on account of the mementoes of the siege. The tower of the Town Hall is preserved as it was left by a shell. The forts on the river bank still remain.

Speaking of the war leads to questions of policy, and it might be expected that one should have formed accurate impressions of the political views of the colonists. South Africa, as you probably know, has always shared with Ireland the role of scapegoat for the party Government of England. In South Africa the disastrous effects of the vacillation caused by this silliest of plans of ruling an empire became prominent. Distance is said to lend enchantment to the view—not, however, of the view by a colony of party government at headquarters. Chiefly on account of this uncertainty

bred of party changes of policy the Home Government met with much condemnation, and the colonists were driven to wish for self-government, which they hoped could at least make up its mind to pursue one continuous policy. It was even said that many who were on the English side in the war would now be on the other, and it was maintained that the present Government was more extravagant, costly, and full of red tape than even that of the Boers was. The farmers and Boers seemed to think a local Government would give them protective taxes, put heavier taxes on the diamond mines, and they thought the Kaffirs should be forced to work by some means. Some said by a heavier hut tax, others by making them wear more clothes, which they would have to earn money to buy; others again by more forcible measures. I gathered from those with whom I happened to speak that Lord Milner was not approved of, was considered to have been weak, extravagant in appointments, and inclined to favouritism. By others some of these faults were attributed to the home Government. Cecil Rhodes was the one man in the colony of whom one always heard approval.

Johannesburg is a red city; the soil is red, the streets, the roofs, even the trees are red from the red sand carried by the dust-storms, to which it is subject. It has an unfinished, scattered look, very poor roads, and an air of hurry and excitement like all mining places. Ten of us were most hospitably entertained at Hohenheim, the residence of Sir Percy Fitzpatrick.

In Johannesburg the remainder of the President's address was delivered, and a very good lecture by Professor Ayrton on electric transmission of power. Speaking of Victoria Falls, he informed them that in the dry season the amount of horse power available was only one-tenth of that of Niagara, and he did not seem to think extremely favourably of the chances of utilising its power at Johannesburg, some 800 miles distant. He concluded, "Jealously guard the beauty of your Falls. Niagara was glorious nature, to day it is power; Victoria is poetry." In a paper published since the meeting, Mr. W. B. Essen disagrees with Professor

Ayrton's view and estimates the cost of transmitting the power as reasonable.

In the various sections some important papers on South African subjects were read—one by Mr. G. W. Lamplugh on the Victoria Falls and others on mining and engineering. These papers connected with South Africa were to be published in one volume by subscription in Johannesburg. I made a communication on a new form of Daniell's battery suitable for laboratory use.

The chief interest in Johannesburg is centred in the gold mines on the Rand. The gold occurs in the finely-divided metallic form in widely-extended reefs. What strikes one is the enormous outlay in plant and machinery, and the extent of the mines. The ore on being brought to the surface is machine broken, and then crushed by stamps, worked on the principle of our beetling engines, to fine powder, from which the gold is extracted first by amalgamation and then by cyanide of potassium solution, which extracts the finer particles. The drilling and work in the mines is done by Kaffirs.

The Kaffirs employed on the mines earn about 50s. per month, and are fed on mealie (maize) porridge, with occasionally meat, and they drink Kaffir beer, which is of the colour and consistency of thin gruel, tasting rather sour. They are well housed, sleeping side by side on shelves with feet towards a fire in the centre of the room. The rooms look about 20ft. high, and the boys look comfortable enough. These sleeping houses surround the yard of the compound. There is a hospital in the small compound adjoining, very clean and airy. The Kaffirs are engaged by recruiting agents sent out to their kraals, aud the chiefs appeared to have a say in the matter, as I was informed they had on some occasions objected to send boys to compounds which were not as sanitary as others.

The general opinion among employers of Kaffirs, both in the mines and farms, and in domestic service, is that it was best to engage the raw native fresh from the kraal. He is more to be trusted than the schooled and christianised native who has lost

the sanctions of his old beliefs, and has probably received a surface smattering of religion and morals which he does not quite assimilate, and he has learnt other things which he would be as well without. Rev. Mr. Flint, librarian of the Cape Parliament, however, was the only person I met holding the opposite view. He contended that the gaol statistics showed this. But then we must remember that every crime or misdemeanour, especially among the servant class, is not brought to justice or to gaol.

Many of the natives, especially the young, are very graceful and easy in movement and gestures. They are said to be good orators. There was rumoured talk of a Kaffir rising, but a very intelligent and sensible owner of a fruit farm near Stellenbosch told me he thought it was merely circulated as an excuse for attacking the natives.

No Chinese are employed at the mines nearest the city, but at my suggestion an opportunity was arranged for a party of us to visit a mine employing Chinese. On the general question of Chinese labour, I gathered it was somewhat disappointing to the managers. Kaffirs, when obtainable, were preferred. I was informed the Chinese are hard to control, and very tricky. They began by carefully cutting half a foot off the end of the measuring rods for measuring the depths of the holes drilled, and fixing up the ends again with true Chinese artfulness, so that they were paid for six inches more per hole for some weeks before it was found out. They could not be induced to take care of their tools, and were otherwise disorderly at work. On the other hand, they learned quicker than Kaffirs, and earned rather more—2s. per day on a three year's contract. They appoint their own police in the compound.

Their food is a hotch-potch of meat and vegetables, very savoury, and cleanly cooked by Chinese cooks. Occasionally they had rice. The meals are served in a large, airy dining-hall. Their sleeping-rooms are even larger than the Kaffirs' and of the same style. They seem to be well cared for, if for no higher reason than that they cost so much, including their passage over, that it paid to keep them in good order. There is also a hospital.

On the whole, I gathered that the mine managers preferred Kaffirs, but the Chinese importation has brought the Kaffirs to a more reasonable frame of mind, and they are more easily dealt with, both by the mine-owners and farmers in the country. If the Chinese were sent home it is reasonable to suppose the Kaffirs would hold out again for higher pay from both managers and farmers. It has been said that if high pay were offered it would produce a larger supply of Kaffir labour. Probably it would ultimately do just the reverse. The Kaffirs are naturally easily contented and disinclined to work, so the Kaffir "boy" merely works long enough to earn sufficient to pay his hut tax and to purchase a couple of oxen, which he can exchange for a wife, who, according to the custom of his country, will do all the hard work at home. High pay would enable him to cease working sooner, a result seen after the high wages paid him during the war. Yet the native Commissioners reported that all over South Africa 270,000 more labourers were still needed.

There is absolutely no question of competition between Kaffirs or Chinese and white men. Both on account of the comparatively small wages the mining, farming, and other South African industries can afford, and the hard work in a hot climate, the white man prefers to be the overseer, the clerk, the responsible "boss." As a matter of fact, according to Sir George Farrar, the importation of Chinese gave employment to 4,000 white men.

As to the cry that the Chinese were in slavery, I must confess I do not understand it. It is scarcely polite to the Emperor of China to assume he would permit it. Mr. Douglas Blackburn, ex-assistant editor of the "Johannesburg Daily Express," writing to the "Times" recently, stated that, while at first there was injustice by incompetent compound managers, the Chamber of Mines took steps to remedy the evil, and now the treatment of Chinese was luxurious, compared with that meted out to the Kaffirs under the old regime, but Mr. Blackburn could not induce the Liberal English papers to ventilate Kaffir grievances. Why this touching sympathy for the Chinese in their comparative luxury?

Just at the time of our visit a few Chinese had got away from the compounds, and had committed crimes, even murders, but strong measures were being taken to round up these miscreants and prevent further misdeeds. I saw a gang of these being brought in, and no doubt such things would in future be prevented. A large party of us visited Pretoria and the Premier Diamond Mines, and saw Kruger's house and the Government Buildings, which were very fine.

Bloemfontein has a rural air, and seems a prosperous and growing town. There was a fair going on, and the Boers bringing in their produce struck me as rather like our own Northern Irish farmers. I was hospitably entertained here by Mr. W. S. Johnston, formerly principal of Larne Grammar School.

From Bloemfontein the line runs through miles and miles of lonely veldt with here and there a herd of cattle or flock of ostriches, apparently trying to eat stones and sunburned grass. At the end of the dry season the country gave an unfairly bad impression.

At Kimberly I was received by Mr. John Orr and his lady with true Irish hospitality. The diamond mines here again struck one as very costly undertakings. The diamonds occur in the famous "blue ground" contained in the immense "pipe" or outlet of an extinct volcano. When brought to the surface it is first spread on the ground to be "weathered," then washed from mud and waste, concentrated, and finally put through a most ingenious apparatus, where it is carried by streams of water over plates covered with grease, to which the diamonds stuck, while the waste was carried on by the water. Kaffirs were employed in these mines, strictly guarded, and thoroughly searched on leaving. We were told, however, that one ingenious person evaded the searchers by concealing diamonds behind his glass eye. Sir William Crookes gave a most interesting lecture on diamonds here. Kenilworth, a kind of garden city arranged by Rhodes for the white employes, was very interesting, with the adjoining experimental fruit gardens and zoological park.

From Kimberly the line runs north through a wilderness of sparse dried grass, with scattered small trees and occasional ant hills, some containing 40 to 50 tons of stuff. There seemed to be no humus or vegetable mould. We assumed that all vegetable remains were washed away as soon as formed in the wet season.

I venture with much diffidence to express an opinion on the question of agriculture in South Africa, which is a difficult one. Most of the country is very dry when it is dry and very wet when it is wet; also subject to disastrous hailstorms, and occasionally to continued droughts, and the locust and other insect plagues are also to be reckoned with. Animals suffer from various diseases, but it was said that in mixed farming out of all the various crops and stock a portion would survive out of which sufficient profit might be made, especially as the population increased and markets improved. The soil varies in quality a good deal, and land of course could be had at a low price, from a free grant upwards. With their large tracts of ground and native labour, the Boers made it pay. The dearth of Kaffir labour owing to the high wages of the war time made it more difficult now, and the Boers, it was said, complained that their products were cut out by imported goods and the cold storage companies. Others thought they were only making a poor mouth in view of getting compensation after the war, Fruit-farming and vine-growing appeared to succeed in parts suitable to these. I was advised that no intending settler should go out without a billet arranged for.

The climate on the high veldt is considered healthy by those who did not mind heat. All over South Africa dust is a great enemy. A doctor told me that they had to eat sand and worse than sand and the alimentary canal suffered. The great agricultural want is water, and it has been said that only by irrigation could South Africa ever hope to become a prosperous agricultural country. The difficulty is to obtain water. Attempts to obtain it by artesian boring have not been encouraging, and the rivers have a comparatively small supply in the dry season, when the water is most needed. By means of dams the flow of the wet season

might be saved, but the size of such dams necessarily would limit their application when we consider that besides the water used a depth of four to seven feet is wasted by evaporation in the hot season. It is estimated that it takes a square mile of catchment area to provide water for one acre in the drier districts. A large dam in Rhodesia, begun by Mr. Rhodes, has been too recently finished to obtain results as yet. Irrigation works are also being carried out in Natal. Considering the enormous increase in the value of land produced by irrigation, it seems likely that when the country has settled down after the disturbance caused by the war more works of this kind would be undertaken in suitable districts either by private enterprise or Government funds.

Buluwayo is a place of magnificent distances—acres of streets, or where streets might be, with here and there a building, some pretentious, others mean. Among the finer are the offices of the mining companies.

I gathered that Rhodesia has not yet been at all thoroughly prospected. Except the newly-started Banket reef, of which much was expected, the gold hitherto discovered is not paying to large mines, but small reefs are found which would pay a small capital outlay. I gathered also that the former management of the Chartered Company was much open to criticism.

The Buluwayo Museum was opened by our President. It already contained many interesting geological, ethnological, and antiquarian specimens. A lecture was delivered in Buluwayo by Mr. M'Iver on Rhodesian ruins, his view being that they were of much later date than formerly supposed, a view meantime not shared by some other antiquarians.

An excursion to the Matopo Mountains, where Cecil Rhodes is buried, was very enjoyable. The rock is granite, and the formation said to be due to water denudation. I imagine ice had something to do with it, but this is a moot point. The view from Rhodes' grave is charming. I should not go so far as to call it "the world's view." North of Buluwayo the country is of the same arid type of wilderness. The line being recently made, big

game are still sometimes seen in its neighbourhood. Two hunters who came after lions were attacked in their sleeping car standing on a railway siding one night, and only one hunter remained in the morning. Elephants had been seen by the train staff. A scarcity of bird life was noticed everywhere on the trip.

The Victoria Falls, on the Zambesia, which is here a mile wide, fall into the upper end of a zig-zag gorge, which, in the opinion of geologists, has been gradually formed by the action of the river. In the way of waterfalls I have not yet seen anything so grand and yet so delicately beautiful. The quantity of water at Niagara is more impressive. It is to be remembered our visit was at the end of the dry season. We arrived before daylight on September 12th, and I saw the falls at sunrise. The water falls into the gorge (380 feet deep and a mile long) in various streams and cataracts, and when the sun got a little higher a beautiful rainbow appeared below me in the spray which issued out of the gorge in flying clouds borne by the wind from the falling water.

A roar of many waters—mist, spray, foam—
A mighty gorge;
Deep in the black abyss a rainbow shone,
Bright steadfast spirit of hope in this chaotic fall.

We saw the falls by moonlight, also very beautiful with mystery. In the afternoon we were taken in boats manned by natives in their scant costumes to Livingstone's Island in the middle of the falls, where the great traveller had made a garden. A tree was pointed out on which he had carved his name.

Walking on the river bank some distance above the falls, where the river was studded with islands and shoals I heard a great splash and saw a large animal (no doubt a hippopotamus) raise its head, and then disappear. I bathed in the Zambesi twice, and it was delightful to feel and see water after the dreadfully arid country we had come through.

The Victoria Bridge, the highest in the world and carrying the railway towards distant Cairo, was opened by the President. It was here that occurred perhaps the most glaring instance of

separation of the party into cliques by a most injudicious management of the Association authorities, which had been all along a great blot on the otherwise harmonious character of the trip. Only a select few were permitted to view the ceremony. The majority of the members were brought to the bridge and there held back out of sight by a military cordon. Among many other such instances might be given the high-handed attempt at Capetown to evict the less distinguished members from their berths on the Durham Castle to make room for the so-called official party ; also the attempt to evade promises of free passes to certain members of the party. Both of these latter attempts met with an undignified but well-deserved collapse. The berths were retained and the promises kept. This matter is mentioned to show that, while it is desirable to induce distinguished people to join these far-away meetings, it is the reverse to emphasise their separation into cliques. The business capacity and organising power of the B.A. officials was also sadly lacking, especially when compared with that of the local officials.

The party now returned to Buluwayo, and divided, some going home via Capetown and the rest of us via Beira and the East Coast in the Durham Castle, specially chartered for the trip, though most of us were greatly afraid of the hot Red sea or red-hot sea, as it was sometimes called. We called at Salisbury, and enjoyed a well-arranged luncheon, and we also spent a few hours at Umtali.

I endeavoured to ascertain from various people in those places what were the agricultural conditions in Rhodesia, and gathered that so far there were difficulties in transport and want of markets and in disease of stock, though one man was hopeful, and said a settler could recoup his outlay in a year or two. The unhealthiness of the country, the dust and dryness, and the tendency to a craving for drink were mentioned.

As we journeyed eastward into Portuguese territory the vegetation improved till near the coast it became green once more. At Beira the Portuguese gave us a most hospitable reception, after

which we were glad to embark, and sail northwards the same afternoon, calling at Mozambique and at Mombasa, a very picturesque island and town among tropical foliage. The old fort had a varied history and is now a prison. The soil appeared more fertile on the Uganda Protectorate, at least where they were, near the coast, as it usually is near the sea.

I have almost finished but as we now leave the more southern portion of Africa, I may show just one slide illustrating very generally the physiology of that portion of the Continent. We all know this familiar and frequent flat topped hill, a common object in South African landscape. The theory of the geologists is that the original surface of the Country was formed by a layer of hard dolerite or igneous rock such as seen on the top of this hill. Denudation by torrential rains gradually washed away the softer parts leaving only more resisting portions forming the table tops of these kopjes. This denudation reduced the level of the surface of the land to the present veldt, which although to appearance seems to be an irregular plain is really made up of a number of very shallow valleys, making up what the geologists call a peni-plain that is almost a plain. Each of these valleys drains into a larger valley and so ultimately into one of the permanent rivers. Down these rivers the soil or sand or stuff forming the difference in height from the original level has been swept during ages into the sea.

It will be clear that such a peni-plain must have originally terminated on or near the sea level but at present the veldt is several thousand feet above the sea and it is therefore thought that after the peni-plain was formed either the whole continent rose or the sea sank. The former seems to be more probable. Denudation is now again going on along the coast line and very beautiful examples of the formation of these branching valleys with their watercourses on the hill side may be seen from the railway line running up through Natal.

An unexpected delay gave us leisure to see Cairo and a bit of Egypt. I seemed to see in these two protectorates how well the Englishman could organise a country when he was more free from

the interference at every step by the home Government and its parties and red tape.

We got cool in the Mediterranean, and saw Stromboli firing out his incandescent ashes and lava. We passed Gibraltar after nightfall, flashing its slow-sweeping searchlights like two eyes of the old lion guarding the narrow seas, and arrived at Southampton on the 24th October, much pleased with our delightful trip.

Professor Symington expressed thanks to Mr. Brown for his admirable lecture, and the lecturer appropriately replied.

6th March, 1900.

PROFESSOR JOHNSON SYMINGTON, M.D., F.R.S., F.R.S.E.
in the chair.

MAGIC IN THE GREEK AND ROMAN WORLD

BY R. M. HENRY, M.A.

(Abstract.)

THE history of primitive Magic has of late years assumed an increased importance in view of its bearing upon the question of the origin of religion, many authorities holding that all primitive religions are based in the last resort upon Magic. By Magic is understood the savage principle of thought that like produces like and the practices (such as rain making, healing diseases by homoeopathic ceremonies and the like) to which it gave rise. There are many survivals of this primitive stage of thought to be found in the practices described by such writers as Lucian and the Elder Pliny. Many of these ceremonies were accompanied by spells which at a primitive period were merely statements that the desired effect had been or would be produced. With a growth of a belief in gods spells tended to become prayers, though the old form still survived side by side with the later. In the spells of the Magical Papyri of Paris, Berlin, Leyden, and London several varieties can be discriminated. The long lines of unintelligible formulae contain many words of Egyptian, Babylonian, and Hebrew origin, pointing to borrowing with more or less intelligence from the magical practices of these nations. The rows of letters of the alphabet are the relics of a superstitious veneration for alphabetical signs, which must have arisen with the invention of writing: the employment of the alphabet as a spell to ward off evil demons is found alike in the ruins of Pompeii and in the Catacombs. A third class of spells in the Papyri are prayers to Apollo or Hekaté.

Astrological theories and the belief in malignant spirits had peopled both heaven and earth in the popular estimation with hostile powers of evil and many magical ceremonies were invented and propagated to protect mankind from their resentment and hostility. This was one of the beliefs taken over by the Church from its heathen neighbours. The possibility of demoniac possession was universally admitted and it was held to be possible for a magician to send a spirit to inhabit the body of one over whom the magician wished to gain power. The destruction of one's enemies was a common object of magical procedure. The leaden *defixiones*, found in hundreds throughout the countries comprised in the Roman Empire, which were inscribed with the name of the person to be cursed and deposited in a grave, are proof of the universality of such practices. They were used by tradesmen in the hope of injuring their rivals, by litigants against their opponents, wives against faithless husbands and *vice-versa.* A large number were drawn up by charioteers with a view to secure the victory over their opponents in the races in the great amphitheatres of Rome and Carthage. The death of an enemy was also supposed to follow the manufacture of a leaden image representing him which was, with appropiate ceremonies, hidden in a grave or flung into the sea. Some of these leaden images are still extant. Similar ceremonies with waxen images could secure the affection of a beloved person: such ceremonies are described by Theocritus, Vergil, and Lucian. To this love magic, in itself harmless, was added the belief in demons, and the horrible practice arose of attempting to secure affection by causing the object of one's desires to be possessed by a demon which brought its victim under complete control. Many curious stories of such practices are recorded and not the least curious are those in which monks and priests undertake to exorcise the demon, never questioning the reality of his presence in the victim.

Often the arts of the magician were directed towards the attainment of useful ends, such as the healing of sickness or the banishing of serpents; often they were employed for purely

frivolous or spectacular purposes, such as walking on the water or flying through the air. St. Peter is credited with having on one occasion banished the demons who were supporting a follower of Simon Magus in the air, with the result that the unfortunate man was dashed to pieces. Many modern customs and ceremonies, of which more edifying explanations are current, are really survivals of the use of magic and of the belief in demons; and the study of such superstitions is not without both an historical and an ethical value.

At the conclusion of the lecture Professor Lindsay, Mr. J. Brown, and other members complimented Mr. Henry upon the excellence of his paper.

REPORT ON THE WORK OF THE MARINE LABORATORY, LARNE HARBOUR.

By. Professor Gregg Wilson, D.Sc., M.R.I.A.

(Abstract.)

Dr. Gregg Wilson's paper dealt with the work of the Marine Laboratory, Larne Harbour, and he began by referring to the equipment of the Association. He stated that the launch was in better condition for work than ever before owing to the kindness of Mr. Jack, of Larne Harbour, who had provided a number of new parts. The laboratory had been maintained in good working order, and the new naturalist (Mr. Wollaston) had carried on the routine work of the Association most efficiently. Research work had been steadily gone on with, old investigations having been continued, and new started. Work at the herring had been pursued, and now the observations were specially directed to determine the distinctions between different varieties and age distinctions. Drift work had also been continued by Mr. C. M. Cunningham, with increasingly interesting results. Apparatus for securing information as to the movements of bottom waters had been devised, and examination of all the records showed more and more clearly that there was a definite set of currents in certain directions. Systematic work at the various groups of organisms continued, and some of the results were now in print.

Mr. Pearson, the former naturalist of the Association, had had the first part of his account of the Copepoda of Ireland published, and the second part was now in the printer's hands. Mr. Adams's paper on "The Algæ of Antrim" had also been completed, and and was ready for issue to the members. Mr. G. C. Gough had finished an account of the "Foraminifera of Larne District," which was also in the printer's hands, while Mr. Joseph Wright was engaged on what might well be his *magnum opus*, an account of the Foraminifera of Ireland. Mr. Wollaston, the naturalist of the

Association, had successfully devoted himself to the Tunicata, a group greatly neglected, but of much interest. Other members of the Association had added to their lists of Crustacea, sponges, Annelida, &c. New work of various kinds was next referred to. Mussels had been dealt with by Dr. Carnwath, who studied those found in Belfast Lough, and watched the changes in their bacterial contents when removed to Larne. He found a rapid decline in bacteria that indicated sewage contamination. His results had been embodied in a paper that would soon be published. Dr. John Milroy had undertaken a laborious investigation of the glycogen present in oysters of different beds at different times of the year. The object was to help in determining the time when Irish oysters were in best condition. The Association had also decided to make experiments in oyster-fattening on the lines of work successfully carried out by the fisheries branch of the Department of Agriculture elsewhere in Ireland. It was proposed to lay down a number of small oysters in "caisses" to study their growth, and ascertain if, as is probable, successful rearing could be carried on in Larne Lough. The oysters experimented with would be examined periodically by a chemist and a bacteriologist, so that the fullest information might be available as to their condition. Mr. W. H. Gallway had undertaken another important addition to the economic work of the Association. He would label a large number of fish and return them to the sea, so that if they were recaptured something might be known of their migrations.

In Scotland and elsewhere such work had yielded valuable information as to the definite and periodic movements. Another new departure has been made by Mr. G. C. Gough, who was engaged studying the bottom deposits from various parts of the Irish coast. Samples taken by the dredge were sent by the Department of Agriculture for examination, and Mr Gough was thus enabled to engage in work that was alike of value to the biologist and of interest to the geologist. The Association's great object of ambition was a good laboratory, with an aquarium attached. The value of the aquarium for educational purposes

would be very great, and it was thought that it would be taken advantage of for teachers' classes, and similar purposes, as was the case with such institutions in England and Scotland.

The lecture was illustrated by lantern illustrations, which added additional interest to it.

A vote of thanks, moved by Mr. Garrett Nagle, R.M., and seconded by Mr. John Horner, was passed to Professor Gregg Wilson.

27th April, 1905.

Sir Otto Jaffe, J.P., in the chair.

Two Papers were read by

W. C. Martin, M.I.E. & S., A.M.I.E.E.

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For the Electrical transmission of Facsimile Writings and Drawings.

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For indicating speed of Machinery, or the frequency of alternating Electric Currents.

ANNUAL REPORT, 1905-6.

The Annual Meeting of the Society was held on 14th September, 1906, in the Museum, College Square North. In the absence of the President (Professor Johnson Symington), the chair was occupied by the President of the Queen's College (Rev. Dr. Hamilton), and amongst those present were Rev. J. Lamont Orr, M.A.; Professor Morton, M.A.; Dr. W. Calwell; Dr. J. M. MacCormac, and Messrs. Robert Young, J.P.; R. M. Young, B.A., J.P. (Hon. Secretary); Seaton F. Milligan, J.P.; George Kidd, J.P.; John Brown, F.R.S,; John Carson; R. A. Kyle; Joseph Wright, F.G.S.; John M. Finnegan, B.Sc., B.A.; John Smith, C.E.; Robert Patterson, M.R I.A.; Nevin H. Foster; H. C. Montgomery; W. Faren; William Gray, M.R.I.A.; Isaac W. Ward; John Horner; A. H. Muir, C.A.; and A. H. Milligan. The notice convening the meeting having been read.

The Hon. Secretary submitted the Annual Report, which was as follows:—

The Winter Session was opened in the Museum on the 7th November, 1905, when an illustrated lecture was given by Mr. Arthur H. Muir, C.A., subject "Belfast Civic Undertakings."

The Second Meeting was held on the 5th December, when an illustrated lecture was kindly delivered by Mr. W. F. de Vismes Kane, M.A., D.L., subject "Prehistoric Man in Southern France."

The Third Meeting was held on the 5th January, 1906, when Professor J. W. Byers, M.A., M.D., lectured on "Ulster Sayings and Folk-lore." Sir James Henderson, M.A., D.L (Vice-President), presided.

The Fourth Meeting was held on the 9th February, in Grosvenor Hall, when Mr. John Brown, F.R.S., delivered a popular scientific lecture, subject "With the British Association in Africa."

The Fifth Meeting was held on the 6th March, when the following papers were read :—(1) "Magic in the Greek and Roman World," by Mr. R. M. Henry, M.A.; (2) "Report on the Work of the Marine Laboratory, Larne Harbour," with lantern illustrations by Professor Gregg Wilson, D.Sc., M.R.I.A.

The concluding meeting took place on the 27th April, when an illustrated lecture was kindly delivered by Mr. W. C. Martin, Electrical Engineer, Glasgow, subject "The Teleautograph, and Frahm's Indicator."

There was a large attendance of the members and of the general public at these meetings. The different societies holding their meetings in the Museum show no diminution. As usual, the Museum was thrown open to the public on Easter Monday and Tuesday at a nominal charge, but the attendance was not so large as usual, mainly owing to weather. No damage was done to any of the collections.

Some valuable donations have enriched the Museum during the year. Foremost amongst these is the Battersby Collection of British Insects, presented by Mrs. Battersby, Cromlyn, Rathowen, Westmeath. Some are of considerable rarity, and the collection is enhanced by the fact that many of the specimens were captured in Ireland. This series of insects is kept as a separate collection and is well displayed in five small cabinets, with thirty-five drawers, and is always available for inspection by those interested in entomology. There has also been received on loan from Mr. Osborne Grimshaw, Portrush, a most interesting collection of specimens of Zulu bead-work, consisting of headdresses, necklaces, beads, etc. It illustrates one aspect of the habits of this African race in the primitive state when unaffected by contact with European civilisation.

Since the last annual meeting the Society has to deplore the loss of two of its oldest and most respected members. Mr. John Anderson, J.P., was a member of Council and Treasurer for many years. Sir Robert Lloyd Patterson, D.L., F.L.S., had been associated closely with the Society for very many years, at first as Joint-Secretary and twice as President for terms of two years each

in 1881 and 1894. He frequently contributed papers on various subjects of zoology, especially ornithology, and was always ready to aid the Society by every means in his power. Your Council have co-opted Sir Otto Jaffe to fill his place on the Council and as Vice-President. The resignation of Mr. W. H. F. Patterson from the Council was received with much regret, and Mr. Nevin H. Foster was co-opted in his stead. A large number of valuable publications issued by the various learned societies who exchange their transactions with ours, have been received and are available to every member.

In accordance with the constitution of the Society, five members of Council retire from office, all of whom are eligible for re-election—Messrs. Nevin H. Foster; Professor Johnson Symington, F.R.S.; Robert M. Young, J.P.; President Hamilton, D.D., LL.D.; and Sir Otto Jaffe, J.P.

Mr. John Horner referred to the statement of accounts, which showed that there was a balance of £26 8s. 5d. due the Treasurer. That, he said was to some extent due to the small number of admissions at Easter and to the falling off in some of their subscriptions, but he believed that before the present year's working was completed they would have the debit completely wiped out and the balance on the right side.

The Chairman, in moving the adoption of the Annual Report and Statement of Accounts, said it seemed to him of increasing importance in Belfast that they should have a Society such as that to form a meeting-place for men and women who are interested in various branches of science, and to preserve collections illustrative of those branches. He trusted that no matter what changes may come, in the direction either of consolidating the museums of Belfast, or in any other direction, the time would never arrive when that old Society, which had for so many years occupied such an honourable place in the city, and which he took leave to say had done such admirable work, would cease to exist. None of them, he was sure, would be averse from seeing the valuable collections which were housed underneath that roof made more

generally available for public use under proper conditions. He was not certain if their Society had the power to dispose of those collections. That would be a matter which would have to be inquired into. The subject did not at present come before them, but he simply repeated that for his part he would deeply regret the coming of the time when the Society either ceased to exist or ceased to perform the various important functions which for so long a period it had discharged so well. The Report showed that during the past session the work of the Society was carried on with its usual vigour and he thought he might say its usual success. He had the pleasure of being present at some of the meetings at which there were discussed subjects of all kinds in connection with various branches of science so as to cater for the different aptitudes and likings of the inhabitants of the city—a very proper and important arrangement and he knew of the success which attended them. In his opinion a good deal of the success of last year's working was due to the labour of their excellent President. Professor Symington was one of the busiest men in Belfast, but in his case they had an illustration of the well-known fact that if they wanted anything done they had better go to a busy man to get it accomplished. He had given himself to the work of that Society with extreme ardour and much success. An ardent votary of science himself, it was his pleasure to see not only the particular branch with which his name was associated, but all branches furthered and advanced in the city. There was only one feature in the Annual Report which caused them all the deepest regret. He referred to the announcement of the deaths of two of their oldest members—Mr. John Anderson and Sir Robert Lloyd Patterson. Both of them had been long connected with that institution, and both of them took a deep interest in its affairs. He had not the pleasure of being intimately acquainted with Mr. Anderson, though he knew well how greatly indebted various literary and scientific organizations in Belfast were to him. But it was his privilege for many years to be on intimate terms of friendship with the late Sir Robert Lloyd Patterson, and on personal grounds as well as for the sake of the

Society, he deeply regretted the fact that they would see his face no more. Everyone who knew him as a friend not only valued but loved him, and every Belfastman also knew and rejoiced that the old and honoured name of Robert Patterson gained increased honour in his person. It was not necessary for him to tell them that Sir Robert was one of their foremost ornithologists, or how well he carried on the old traditions which were associated so long with the name of William Thompson, and which had shed such lustre not merely on their Society, but on the whole North of Ireland. He trusted that the loss of such eminent members might stir up others to come forward and take their place in maintaining the interests of a body with which were so intimately bound up the interests of science in their city.

Mr. John Smith seconded the adoption of the Report, which was agreed to unanimously.

Mr. William Gray moved the re-election of the retiring members of Council—President Hamilton, Sir Otto Jaffe, Professor Symington, Mr. Nevin H. Foster, and Mr. R. M. Young. He (Mr. Gray) believed that the question of the amalgamation of the museums must come before the public in a very short time, and in his opinion the time had arrived when it would be judicious for the public to take steps in that direction with a view to the Society's collections becoming part and parcel of the municipal museum. Overtures, however, in connection with such an arrangement ought to come from the public, not from the Society.

Mr. A. H. Muir seconded the motion, which was passed.

On the motion of Dr. Calwell, seconded by Mr. H. C. Montgomery, a cordial vote of thanks was passed to President Hamilton for presiding.

Mr. George Kidd said he hoped it would not be permitted to go out from that meeting that the Shareholders would be likely to adopt a resolution transferring the Society's collection to the Corporation. He had seen in the "Northern Whig" that morning a letter from a Shareholder, who put forward as one of the chief reasons for taking such a step the great price which the Shareholders

would obtain for their shares. It would be a poor testimonial to the Society as it existed at present and a poor tribute to the memories of the men who had built it up in the past to think for a moment of scattering their collection for such a reason as this. How any person could think that the collection of the Society would be better in the hands of the Corporation was more than he could understand. From a pretty long recollection of the Corporation he must say he thought the Museum would be better in its present location. The Corporation ought to establish, and doubtless would establish, a municipal museum, but he did not think it at all likely that the contents of the Society's Museum would ever be allowed by the Shareholders to be handed over to it. The Society was well able to keep its collection, and to talk of maintaining the Society and handing over its collection was a dangerous suggestion, the carrying out of which would weaken, if not extinguish altogether the Society. He took the liberty of suggesting that the Shareholders present should be allowed to give expression to their views on the subject.

The Chairman said he had not liked to interrupt Mr. Kidd in his remarks, but the business for which they had been summoned had been concluded, and it would not be in order now to launch out into a discussion such as was proposed. The Society might depend upon it that the Council would take no step in the matter without calling the members together, and giving them the most ample opportunity of considering the subject in all its bearings.

Mr. Muir said the letter referred to by Mr. Kidd suggested that the Shareholders were anxious to make a profit for themselves out of the collection. He wished to protest against this suggestion. Nothing was further from their thoughts than to seek their own personal advantage in this matter.

In reply to Mr. Kyle, Mr. Horner said there were 160 Shareholders and about 20 Subscribers in the Society.

The matter then dropped, and the Meeting terminated.

The Officers of the Society for the year were elected by the Council after the Annual Meeting:—President, Sir Otto Jaffe, J.P.;

Vice-Presidents, Sir James Henderson, D.L., Rev. President Hamilton, Robert Patterson, M.R.I.A., W. Swanston, F.G.S.; Hon. Treasurer, John Horner, J.P.; Hon. Librarian, John H. Davies; Hon. Secretary, R. M. Young, B.A., J.P.

EDUCATIONAL ENDOWMENTS (IRELAND) ACT, 1885, 48 & 49 Vict., ch. 78.

The Account of the Council of the Belfast Natural History and Philosophical Society for the year ended 30th April, 1906.

Dr. Cr.

CHARGE.

	£ s. d.	£ s. d.
To Balance as per last Account ...		£10 2 9
,, Amount of Donations, Bequests and other Endowments, ...		7 0 0
,, Subscriptions ...		95 9 0
,, Dividends ...		17 2 0
,, Rents ...		28 17 0
,, Fees ...		0 5 0
,, Sales ...		0 3 6
,, Miscellaneous Receipts, viz:—		
Proceeds of Lecture ...	£6 10 6	
Admission Fees ...	18 14 0	
Easter Receipts ...	9 12 2	
		34 16 8
		£193 15 11
,, Balance due Treasurer ...		26 8 5
Total ...		£220 4 4

DISCHARGE.

	£ s. d.	£ s. d.
By Amount of Payments under the f llowing headings:—		
Maintenance of Premises, &c ...	£15 8 6	
Rent and Taxes, &c, ...	30 0 0	
Salaries ...	93 14 6	
		139 3 0
,, Other Payments viz:—		
Printing and Stationery ...	33 7 8	
Advertising ...	6 0 10	
Postage and Carriage ...	5 10 10	
Fuel and Gas ...	14 17 5	
Other Payments ...	21 4 7	
		81 1 4
Total Payment ...		220 4 4
Total ...		220 4 4

N.B.—Besides the above Balance there is a sum of £400 standing to the Credit of this Account in the York Street Flax Spinning Co, Ltd., 4½ per cent. Debenture Stock

We certify that the above is a true Account.

ROBERT M YOUNG, Governor
JOHN HORNER, Accounting Officer.

Dated this 12th day of June, 1906.

I certify that the foregoing Account is correct.

J. F. MAYNE, Auditor.

Dated this 29th day of June, 1906.

DONATIONS TO THE MUSEUM, 1st MAY, 1905, TILL 1st MAY, 1906.

From Mr. W. Campbell.

Seven old newspapers—*The Belfast News-Letter*—dates 1812-13-14-15.

From Mr. Robert Welch, M.R.I.A.

Five specimens of *Trochus zizyphinus*, from Portaferry, Strangford Lough, and three specimens of *Achatina cœcilloides*, from Co. Kilkenny.

From Mr. Joseph Wright, F.G.S.

Specimen of Primary Limestone, covered with cup-shaped hollows on the surface, from Sessiagh Lough, North Donegal.

From Mr. Graham Renshaw, Manchester.

Seventeen photo engravings of natural history objects.

From Mrs. Battersby, Cromlyn, Rathowen, Westmeath.

Five cabinets of British insects.

From Mr. J. P. Barrett, Margate, Kent.

Seventy specimens of Lepidoptera.

From Mr. Seaton F. Milligan, M.R.I.A., J.P.

A specimen of the sea-mouse (Aphrodita aculeata), from Bangor.

ADDITIONS TO THE LIBRARY, 1st MAY, 1905, TILL 1st MAY, 1906.

FROM

ADELAIDE.—Memoirs of the Royal Society of South Australia. Vol. 1, part 3, and Transactions. Vol. 29, 1905.
The Society.

ALBANY.—Flfty-sixth Annual Report of the New York State Museum. Vols. 2—4, 1904.
University of the State of New York.

ANN ARBOR.—Fifth Report of the Michigan Academy of Science, 1904, and Seventh Report, 1905.
The Academy.

BASEL.—Verhandlungen der Naturforschenden Gesellschaft in Basel. Vol. 18, part 1, 1905, and part 2, 1906.
The Society.

BERGEN.—Bergens Museums Aarbog, parts 1—3, 1905, and part 2, 1906. *The Director.*

BOLOGNA.—Rendiconto della R. Accademia delle Scienze dell' Istituto di Bologna. Vols. 5—8, 1901—1904.
The Institute.

BOSTON.—Memoirs of the Boston Society of Natural History. Vol. 5, No. 10, 1903, No. 11, 1904, and Vol. 6, No. 1, 1906. Proceedings. Vol. 31, Nos. 2—5, 1903, Nos. 6 – 10, 1904, aud Vol. 32, Nos. 1 and 2, 1904; also Occasional Papers, Vol. 7, Nos. 1—3, 1904. *The Society.*

BREMEN.—Abhandlungen Herausgegeben vom Naturwissenschaftlichen Verein Zu Bremen. Vol. 18, part 1, 1905. *The Society.*

BRESLAU.—Zeitschrift für Entomologie vom Verein für Sclessiche Insektenkunde. New series, part 30, 1905.
The Society.

BRIGHTON.—Abstracts and Annual Report of Brighton and Hove Natural History and Phllosophieal Society, 1905. *The Society.*

BRISBANE.—Annals of Queensland Museum, No. 6, 1905.
The Director.

BROOKLYN.—Science Bulletin of Brooklyn Institute of Arts and Sciences. Vol. 1, Nos. 5—7, 1905, and Cold Springs Harbour Monographs, Nos. 3—5, 1905.
The Institute.

BRUSSELS.—Bulletin de la Société Royale de Botanique de Belgique. Vol. 41, part 1, 1905, and vol. 42, parts 1 and 2, 1905. *The Society.*

,, Annales de la Société Entomologique de Belgique. Vol. 49, 1905. *The Society.*

,, Annales de la Société Royal Zoologique et Malacologique de Belgique. Vol, 39, 1905,
The Society.

BUENOS AYRES.—Anales del Museo Nacional de Buenos Aires. Ser. 3, vol. 3, 1904, and vols. 4 and 5, 1904—5.
The Director

CALCUTTA.—Memoirs of the Geological Survey of India (Palæontologia Indica). New ser., vol.2, Memoir 2, 1905, and Records, vol. 22, parts 2—4, 1905, and vol. 23, part 1, 1906. *The Director.*

CAMBRIDGF.—Proceedings of Cambridge Philosophical Society. Vol. 13, parts 2 and 3, 1905, and part 4, 1906.
The Society.

CAMBRIDGE, MASS.—Bulletin of the Museum of Comparative Zoology. Vol. 46, parts 4—10, 1905, and parts 11—13, 1906; vol. 47, 1905; vol. 48, part 1, 1905, and part 2, 1906; vol. 49, parts 1—3, 1906; also Report of Curator for 1905.
The Keeper of the Museum.

CARDIFF.—Transactions of Cardiff Naturalists' Society. Vol, 27, 1904, and vol. 28, 1905. *The Society.*

CASSEL.—Abhandlungen des Vereins für Naturkunde zu Cassel, 1905. *The Society.*

CHICAGO.—Bulletin of Chicago Academy of Sciences. Nos. 3 and 5, 1902; also Special Publications, No. 1, 1902. *The Academy.*

CHRISTIANIA.—Forhandlinger i Videnskabs-Selskabet i Christiania, for year 1904.
The Royal Norske Frederiks University.

CINCINNATI.—Bulletin of the Lloyd Library, No. 7, 1903, and 8, 1905, and Mycological Notes, 1904.

COLORADO SPRINGS.—Colorado College Studies. Six numbers, 1904—6. *Colorado College Scientific Society.*

COSTA RICA.—Anales del Instituto Fisico-Geographico Nacional de Costa Rica. Vol 9, 1896.
The Institute.

DANTZIC.—Schriften der Naturforschenden Gesellschaft in Danzig Vol. 11, part 3, 1905. *The Society.*

DAVENPORT, Iowa.—Proceedings of Davenport Academy of Sciences. Vol. 9, 1904. *The Academy.*

DRESDEN.—Jahresbericht der Gesellschaft für Natur und Heilkunde in Dresden, 1905. *The Society.*

DUBLIN.—Scientific Transactions of the Royal Dublin Society. Ser. 2, vol. 8, parts 6–12, 1904; parts 13—16, 1905; and vol. 9, part 1, 1905; and part 2, 1906. Scientific Proceedings, New Series, vol. 10, part 2, 1904, and part 3, 1905. Vol. 11, parts 1–5, 1905, and Nos. 6 and 7, 1906. Also Economical Proceedings. Vol. 1, parts 5-7, 1904—6.
The Society.

EDINBURGH.—Transactions and Proceedings of the Botanical Society of Edinburgh. Vol. 23, part 1, 1905.
The Society.

EDINBURGH—Proceedings of the Royal Society of Edinburgh. Vol. 24, 1902-3, and vol. 25, parts 1 and 2, 1904-5. *The Society.*

„ Proceedings of the Royal Physical Society. Vol. 16, No. 3, 1905, and Nos. 4 and 5, 1906. *The Society.*

EMDEN — Jahresbericht der Naturforschenden Gesellschaft in Emden, 1905. *The Society.*

GENOA.—Rivista Liguere di Scienze, Letture, ed Arti Anno 27, fasc. 2—6, 1905, and anno 28, fasc. 1, 1906. *Societa Letture e Conversazione Scientifiche.*

GIESSEN.—Bericht der Oberhessichen Gesellschaft für Natur und Heilkunde, 1905. *The Society.*

GLASGOW.—Proceedings of the Royal Philosophical Society of Glasgow. Vol. 36, 1905. *The Society.*

HALIFAX.—Proceedings and Transactions of the Nova Scotian Institute of Science. Vol. 11, part 1, 1905. *The Institute.*

HAMBURG.—Verhandlungen des Naturwissenschaftlichen Vereins in Hamburg, 1905. *The Society.*

IGLO.—Jahrbuch des Ungarischen Karpathen Vereines, 32nd year, 1905. *The Society.*

INDIANOPOLIS.—Proceedings of the Indiana Academy of Sciences, 1903 and 1905. *The Academy.*

KHARKOW.—Transactions of the Society for Physico Chimiques of Karkow University. Vol. 32, 1904. *The Society.*

KIEW.—Memoirs of the Society of Naturalists of Kieff. Vol. 20, part 1, 1905. *The Society.*

LA PLATA.—Demografia. Ano 1900—1902. *The Director General of Statistics.*

LAUSANNE.—Bulletin de la Société Vaudoise des Sciences Naturelles. Vol. 41, Nos. 152—154, 1905. *The Society.*

LAWRENCE.—Science Bulletin of Kansas University. Vol. 2, Nos. 10—15, 1904. *The University.*

LEEDS.—Eighty-fourth and Eighty-fifth Annual Reports of Leeds Philosophical and Literary Society, 1904-5. *The Society.*

LEIPSIC.—Mitteilungen des Vereins für Erdkunde zu Leipzig, 1904. *The Society.*

,, Sitzungsberichte der Naturforschenden Gesellschaft zu Leipzig, 1903-4. *The Society.*

LIMA.—Boletin del Cuerpo de Ingenieros de Minas del Peru. Nos. 25—28, and Maps, 1905. *The Director.*

LONDON.—British Association, Report of the 74th Meeting – Cambridge, 1904. *The Association.*

,, Memoirs of the Royal Astronomical Society. Vol. 57, parts 1 and 2, 1905, and Appendix to vol. 55, 1904. *The Society.*

,, Quarterly Journal of the Geological Society of London. Vol. 61, parts 2—4, 1905, and vol. 62, part 1, 1906. Also Geological Literature added to the Library in 1905, and List of Fellows, 1905 *The Society,*

,, Journal of the Royal Microscopical Society, Nos. 166—169, 1905, and Nos. 170 and 171, 1906. *The Society.*

,, Transactions of the Zoological Society of London. Vol. 17, parts 4 and 5, 1905, and Proccedings of 1904, vol. 2, part 2. Proceedings of 1905, vol., 1, parts 1 and 2, and vol. 2, parts 1 and 2. *The Society.*

MADISON.—Transactions of Wisconsin Academy of Science, Arts, and Letters. Vol. 14, part 2, 1904. *The Academy*

,, Bullentin of Wisconsin Geological and Natural History Survey. No. 13, 1904. *The Commissioners,*

MADRAS.—Report on the Madras Government Museum and Library for 1904—5. *The Superintendent*

MANCHESTER.—Journal of Manchester Geographical Society. Vol. 20, Nos. 4—12, 1904, and vol. 21, Nos. 1—6, and 10—12, 1905. *The Society.*

MANILA.—Ethnological Survey Publications. Vol. 2, part 1, 1904, and vol. 4, part 1, 1905. Also the Philippine Journal of Science, vol. 1, No. 1, 1906, and Hand List of the Birds of the Philippine Islands, and Birds ot Mindora, 1906. *The Philippine Bureau of Science.*

MARSEILLES.—Annales de la Faculté des Sciences de Marseille. Vol. 15, fasc, 1—5, 1905. *The Librarian.*

MELBOURNE.—Proceedings of the Royal Society of Victoria. Vol. 18, part 1, 1905, and part 2, 1906. *The Society.*

MEXICO.—Anales de Meteorologia Mexicana, 1905, and Boletin Mensual, Sept. and Oct., 1902, and May, 1904; also Anuaria, 1905. *The Director of the Observatory.*

„ Boletin del Instituto Geologico de Mexico, No. 20, 1905, and Parergones, vol. 1, No. 7, 1904, and Nos. 8 and 9, 1905. *The Institute.*

MILWAUKEE.—Bulletin of Wisconsin Natural History Society. Vol. 3, No. 4, 1905, and Twenty-third Annual Report of the Board of Trustees of Milwaukee Public Museum, 1905. *The Society.*

MISSOULA.—University Bulletin, Nos. 23—29 and 31, 1904-5. *The Universitv.*

MONTEVIDEO.—Anales del Museo Nacional de Montevideo. Vol. 2, parts 1 and 2, 1905. *The Director.*

MOSCOW.—Memoirs of the Imperial Society of Naturalists of Moscou. New series, vol. 16, part 1, 1901, and part 4, 1905; also Bulletin, No. 4, 1904. *The Society.*

NANTES.—Bulletin de la Société des Sciences Naturelles de l'Ouest de la France Series 2, vol. 5, parts 1—3, 1905. *The Society.*

NEW YORK.—Bulletin of the American Geographical Society. Vol. 37, Nos. 4—12, 1905, and vol. 38, Nos. 1—3, 1906. *The Society.*

" Memoirs of New York Academy of Sciences. Vol. 2, part 4, 1905, and Annals. Vol. 16, parts 1 and 2, 1905. *The Academy.*

NOTTINGHAM.—Fifty-second and Fifty-third Annual Reports and Transactions of Nottingham Naturalists Society, 1905-6. *The Society.*

OPORTO.—Annaes Scientificos do Academia Polytechnica do Porto. Vol. 1, No. 1, 1905. *The Academy.*

PADUA. — Atti della Accademia Scientifica Veneto-Trentina Istriana. New series, Anno 2, fasc. 1 and 2, 1905. *The Academy.*

PHILADELPHIA.—Proceedings of the Academy of Natural Sciences of Philadelphia. Vol. 46, part 2, 1904, and part 3, 1905, and vol. 47, parts 1 and 2, 1905. *The Academy,*

" Proceedings of the American Philosophical Society, Nos. 177 and 178, 1904. and Nos. 179 and 180, 1905, and No. 181, 1906. *The Society*

PISA.—Atti della Società Toscana di Scienze Naturali. Vol. 14, Nos- 6—10, 1905. *The Society.*

ROCHESTER, N.Y.—Proceedings of Rochester Academy of Science. Vol 4, four Nos. 1904-5. *The Academy.*

ROME.—Atti della Reale Accademia dei Lincei. Vol. 14, semestre 1, fasc. 8-12, semestre 2, fasc. 1-12, 1905, and vol. 15, semestre 1, fasc. 1—4, 1906. Also Rendiconto, 1905. *The Academy.*

ROME.—Journal of the British and American Archæological Society of Rome. Vol. 3, No. 7, 1905.
The Society.

,, Bollettino della Societá Zoologica Italiana. Ser. 2., vol. 6, fasc. 4—8, 1905, and vol. 7, fasc. 1—3, 1906.
The Society.

SAN FRANCISCO. Proceedings of California Academy of Sciences. Ser., 3, vol. 1, Nos. 7—13, 1904.
The Academy

STAVANGER.—Aarshefte of Stavanger Museum for the year 1904. *The Museum Trustees.*

STETTIN.—Bericht uber das Vereinsjahr, 1904—5.
The Society.

STIRLING. — Transactions of Stirling Natural History and Archæological Society for 1905. *The Society.*

STOCKHOLM.—Kungl Svenska Vetenskaps Handlingar. Vol. 39, Nos. 1—6, 1905. Arkiv for Botanik. Vol. 4. parts 1—4, 1905. Arkiv for Kemi, Mineralogy, och Geologi. Vol. 2, part 1, 1905, and part 2, 1906. Arkiv for Mathematik, Astronomi och Fysik. Vol. 2, parts 1 and 2, 1905. Arkiv for Zoologi. Vol. 2, parts 3 and 4, 1905, and vol. 3, part 1, 1906. Arsbok for 1905, and Memoirs of Artedi; also Les Prix Nobel en 1902—1904-5.
The Academy.

TOPEKA.—Transactions of Kansas Academy of Science. Vol. 19, 1905. *The Academy.*

TORONTO—Transactions of the Canadian Institute. Vol. 8, part 1, 1905. *The Institute.*

TOKYO.—Mitteilungen der Deutschen Gesellschaft für Natur und Volkerkunde Ostasiens. Vol. 10, part 2, 1905.
The Society.

UPSALA.—Bulletin of the Geological Institution of Upsala University. Vol. 6, Nos. 11 and 12, 1905.
The University.

VIENNA.—Verhandlungen der Kaiserlich-Koniglichen Geologischen Reichsanstatt. Nos. 3—18, 1905, and No. 1, 1906. *The Society.*

,, Verhandlungen der K.K. Zoologisch-Botanischen Gesellschaft in Wien. Vol. 55, 1905. *The Society.*

WASHINGTON.—Twenty-first Annual Report of the American Bureau of Ethnology, 1903, and Twenty-second Report, parts 1 and 2, 1904. *The Director of the Bureau.*

,, Smithsonian Contributions to Knowledge. Vol. 33, 1904, and vol. 34, part 1, 1903, and part 2, 1904. Smithsonian Miscellaneous Collections, one part of vol. 44, and 3 parts of vol. 46, 1904—5; also Quarterly Issue, vol. 2, part 2, 1904, parts 3 and 4, 1905, and vol. 3, parts 1 and 2, 1905; also Smithsonian Exploration in Alaska, 1905. Proceedings of the United States National Museum, vol, 28, 1905; Bulletin No. 50, 1904, and Nos, 53—55, 1905; also Useful Plants of Guam, 1905. *The Institution.*

,, Bulletin of the Philosophical Society of Washington, Nos. 23, 24, and 30, 1905. *The Society.*

,, Publications of the Carnegie Institution. Three parts, 1905. *The Institution.*

YORK.—Annual Report for 1904 of Yorkshire Philosophical Society. *The Society.*

ZURICH.—Vierteljahreschrift der Naturforschenden Gesellschaft in Zurich, 94th year, parts 3 and 4, and 95th year, parts 1—3, 1905. *The Society.*

FROM RobertWorkman, Esq. The Annual volumes, from 1848 till 1854, and volume for 1856, of the Monographs of the Palæontographical Society.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

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Andrews, George, J.P., Ardoyne, do.
Armstrong, Thomas, jun., Donegall Square West, do.
Armstrong, William, Chichester Gardens, do.

Baird, Wm., Royal Avenue, do.
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Beattie, Rev. A. Hamilon, Portglenone, Co. Antrim
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*Boyd, J. St. Clair, M.D., Chatsworth, Malone Road, do.
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Brett, Sir Charles H., Gretton Villa South, Malone Road, Belfast
Brett, John H., C.E., Fortwilliam Park, do.
Bristow, James R., Prospect, Dunmurry, Co. Antrim
Bristow, John, Wellington Place, Belfast
Brown, John, F.R.S., A.M.I.E.E., Longhurst, Dunmurry, Co. Antrim
Brown, William K. (Representatives of), Belfast
Bulloch, Alexander, Eversleigh, Malone Road, do.
Burrowes, W. B., Ballynafeigh House, do.
Byers, Prof. John W., M.A., M.D., Dreenagh House, Lower Crescent, do.

Calwell, William, M.A., M.D., College Square North, do.

*Campbell, Miss Anna (Representatives of), Belfast
Carr, A. H. R., Waring Street, do.
Carson, John, Walmer Terrace, Holywood
*Charley, Phinea H., Mornington Park, Bangor, Co. Down
*Christen, Mrs. Rodolphe, St. Imier, Brig o' Gairn, Ballater, N.B.
Clark, George S., Dunlambert, Belfast
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Coates, Victor, J.P., D.L., Rathmore, Dunmurry, Co. Antrim
Connor, Charles C., M.A., J.P., Queen's Elms, Belfast
Combe, George, Cranethorpe, Strandtown, do.
Crawford, Sir William, J.P., Mount Randal do.
Crawford, William, Calendar Street, do.
Craig, Edwin E., Craigavon, Strandtown, do.

Davies, John H., Lenaderg House, Banbridge, Co. Down
*Deramore, Lord, D.L. (Representatives of),
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*Donegall, Marquis of (Representatives of), Belfast
*Downshire, Marquis of (Representatives of), The Castle, Hillsborough, Co. Down
Duffin, Adam, LL.D., Dunowen, Cliftonville, Belfast
Dunleath, Lord, Ballywalter Park (Representatives of), Ballywalter, Co. Antrim

Ewart, G. Herbert, M.A., Firmount, Antrim Road, Belfast
Ewart, Fred. W., M.A., B.L., Derryvolgie, Lisburn
Ewart, Sir Wm. Quartus, Bart., M.A., J.P., D.L., Glenmachan House, Belfast

Faren, Wm., Mountcharles, do.
*Fenton, Francis G., Paris
Ferguson, Godfrey W., C.E., Dunedin, Antrim Road, Belfast
Finlay, Fred. W., J.P., Wolfhill House, Ligoniel, do.
Finlay, Robert H. F., Cavehill Road, do

Finnegan, John, B.A., B.SC., Kelvin House, Botanic Avenue, Belfast
Fisher, Joseph R., Alexandra Gardens, do.
FitzGerald, Professor Maurice F., B.A., M.I.M.E., Assoc. M.I.C.E., Eglantine Avenue, do.
Foster, Nevin Harkness, Hillsborough, Co. Down

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Gibson, Andrew, F.R.S.A.I., Cliftonville Avenue, do.
Girdwood, H. M., Broughton Flax Mills, Manchester
Gordon, Malcolm, Hilden, Lisburn
Grainger, Rev. Canon, D.D., M.R.I.A. (Representatives of), Broughshane, Co. Antrim
Gray, William, M.R.I.A., F.R.S.A.I., Glenburn Park, Cavehill Road, Belfast

*Hall, Frederick H., Waterford
Hamilton, Rev. Thomas, D.D., LL.D.. President, Queen's College, Belfast
*Hamilton, Hill, J.P. (Representatives of), do.
Harland, Captain W., M.A., 69 Chester Terrace, London, S.W.
Henderson, Sir James, A.M., J.P., D.L., Oakley, Windsor Park, Belfast
Henry, R. M., M.A., do.
Herdman, John, J.P., D.L., Carricklee House (Reps. of), Strabane
Herdman, F. S., The Drift, Antrim Road, Belfast
*Herdman, Robert Ernest, J.P., Rosavo, Cultra, Co. Down
Heyn, James A. M., Strandtown House, Belfast
Hind, John, junr., do.
Hodges, Miss do.
Hogg, John, Academy Street, do.
Horner, John, Chelsea, Antrim Road, do.
*Houston, John Blakiston, J.P., V.L., Orangefield, do.
*Hughes, Edwin, J.P., Dalchoolin, Craigavad, Co. Down
Hyndman, Hugh, LL.D. (Representatives of), Windsor, Belfast

Inglis, James, J.P., Merrion Square East, Dublin

Jackson, A. T., C.E., Tighnabruaich, Derryvolgie Avenue, Belfast
Jaffe, Sir Otto, J.P., Kin Edar, Strandtown, do.
Johnston, Samuel A., J.P., Dalriada, Whiteabbey, Co Antrim

Kennedy, Mrs. Amelia, Dalguise, Monkstown, Dublin
Kertland, Edwin H., Chlorine Gardens, Belfast
Kidd, George, J.P., Greenhaven, Malone Park, do.
*Kingham, John R., Altoona, Windsor Avenue, do.
Kinnaird, George Y., do.
Kyle, Robert Alexander, Donegall Place, do.

Lanyon, Mrs., Lisbreen, Fortwilliam Park, do.
Larmor, Joseph, M.A., D.SC., LL.D., F.R.A.S., F.R.U.I., Sec.R.S., St. John's College, Cambridge
Leathem, R. R., M.D., B.A., Belgravia, Lisburn Road, Belfast
Lemon, Archibald Dunlop, J.P., Edgecombe, Strandtown, do.
Lepper, F. R., J.P., Elsinore, Carnalea, Co. Down
Letts, Professor E. A., PH.D., F.C.S., Shirley Lodge, Cultra, do.
Lindsay, Professor James A., M.A., M.D., College Sq. East, Belfast
Lytle, David B., J.P., Bloomfield House (Representatives of), do.
Lytle, Joseph H., J.P., Ashleigh, Windsor Avenue, do.

Macassey, L. Livingstone, B.L., M.I.C.E., St. Clair, Windsor Av., do.
Mackenzie, John, C.E.. Lisburn Road, do.
*Macrory, A. J. (Representatives of), do.
Magill, J. E., Easton Terrace, Cliftonville, do.
Malcolm, Bowman, M.I.C.E., M.I.M.E., Ashley Park, Antrim road, do.
Maxton, James, M.I.N.A., M.I.MAR.E., Kirkliston Drive, Bloomfield, do.
Maxwell, David A., College Gardens, do.
Mayes, William, Drumcairn, Deramore Park, do.
Milligan, A. H., Springfield Road, do.
Milligan, Seaton Forest, M.R.I.A., F.R.S.A.I., J.P., Bangor, Co. Down
Mitchell, Robert A., LL.B., T.C.D., Marmont, Strandtown, Belfast
Montgomery, Henry C., Craigavad, Co. Down

Montgomery, H. H., Strandtown, Belfast
Montgomery, Thomas, J.P., D.L., Ballydrain House, Dunmurry, Co. Antrim
Moore, James, The Finaghy, Belfast
Morton, Professor W. B., M.A., F.R.U.I., Nottinghill, do.
Muir, A. H., C.A., Scottish Provident Buildings, do.
Mullen, William, Lindisfarne, Marlborough Park, do.
Murney, Henry, M.D., J.P., Tudor House, Holywood, Co. Down
*Murphy, Isaac James (Representatives of), Armagh
*Murphy, Joseph John (Representatives of), Belfast
Musgrave, Edgar, Drumglass, Malone, do.
*Musgrave, Henry, Drumglass, Malone, do.

M'Bride, Henry James, J.P., Hyde Park, Mallusk, do.
M'Bride, Samuel, Edgehill, Lennoxvale, do.
M'Calmont, Robert (Representatives of), London
M'Cammon, Thos. P., Plaisted, Woodville, Holywood, Co. Down
M'Cance, Miss Charlotte Georgianna, Larkfield (Representatives of), Dunmurry, Co. Down
MacColl, Hector, Kirkliston Drive, Bloomfield, Belfast
MacCormac, John M., M.D., Victoria Place, do.
M'Cormick, Hugh M'Neile, Cultra House, Holywood, Co. Down
*M'Cracken, Francis (Representatives of),
M'Gee, James (Representatives of), Holywood, do.
M'Ilwaine, John H., Mornington Park, Bangor, do.
M'Kisack, H. L., M.D., University Square, Belfast
*MacLaine, Alexander, J.P., Queen's Elms, do.
M'Neill, George, Beechleigh, Malone road, do.

Neill, Sharman D., Martello Terrace, Holywood, Co. Down
Nicholson, Henry J., Bedford Street, Belfast

O'Rorke, Mrs., Dunratho, Craigavad, Co. Down
Orr, Hugh L., Charnwood Avenue, Belfast
Orr, Rev. R. J., Ireton Street, do.
O'Neill, Henry, M.D., J.P., B.L., College Square East, do.

Park, Rev. Wm., M.A., Garthowen, Sans Souci Park, Belfast
Patterson, Edward Ferrar, Ballyholme Road, Bangor, Co. Down
Patterson, Mrs. Isabelle, Bonn, Germany
Patterson, John, Dunallan, Windsor Avenue, Belfast
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Croft House (Executors of), do. do.
Patterson, Robert, M.R.I.A., F.Z.S., M.B.O.U.,
Glenbank, do. do.
Patterson, William H., M.R.I.A., Garranard, Strandtown, Belfast
Patterson, William H. F., Stalheim, Knock, do.
Pim, Edward W., J.P., Elmwood Terrace, do.
Pim, Joshua, Slieve na-Failthe, Whiteabbey, Co. Antrim
Praeger, R. Lloyd, B.A., B.E., M.R.I.A., National Library, Dublin

Rea, John Henry, M.D., University Street,
(Representatives of), Belfast
Rea, William R., Abbeylands, Whiteabbey, Co. Antrim
Reade, Robert H. S., J.P., D.L., Wilmont, Dunmurry, do.
Riddell, Henry, Great Victoria Street, do.
Robertson, William, J.P., (Representatives of), Netherleigh, Strandtown, do.
Robinson, John, Sydenham Road, do.

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Ravenhill Road, do
Shillington, Thomas Foulkes, J.P., Dromart, Antrim Road, do.
Simms, Felix Booth, Queen Street, do.
Sinclair, Right Hon. Thomas, M.A., J.P., D.L., Hopefield, do.
Sinclalr, Prof. Thomas, M.D., F.R.C.S.Eng., University
Square, do.
Smith, John, C.E, Castleton Terrace, do.
Smyth, John, M.A., C.E., Milltown, Banbridge, Co. Down
Speers, Adam, B.SC., Riverside, Holywood, do.
Steen, William C., M.D., Laleham Corner, Lower Northdown Road, Margate

Steen, William, B.L., Northern Bank, Victoria Street, Belfast
Stelfox, James, Oakleigh, Ormeau Road, do.
Swanston, William, F.G.S., Cliftonville Avenue, do.
Symington, Prof. Johnson, M.D., F.R.S., F.R.S.E., Queen's College, do.

*Tennent, Robert (Representatives of), Rushpark, do.
*Tennent, Robert James (Representatives of), Rushpark, do.
Torrens, T. H., J.P., Wellington Place, do.
*Turnley, John (Representatives of), do.

Walkington, Miss Jane A. Sefton Park, Liverpool
Walkington, Thomas R. Edenvale, Strandtown, Belfast
Wallace, John, Chlorine Gardens, Malone Road, do.
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Ward, John, J.P., F.S.A., Lennoxvale, Malone Road, do.
*Webb, Richard T., Kensington Villa, Knock Avenue Road, do.
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Wilson, Prof. Gregg, M.A., PH.D., D.SC., M.R.I.A., Queen's College, do.
Wilson, James, M.E., Oldforge, Dunmurry, Co. Antrim
Wilson, John K., J.P., Donegall Street, Belfast
*Wilson, Walter H., Belvoir Park (Representatives of), do.
*Wilson, W. Percival, do.
*Wolff, G. W., J.P., M.P., The Den, Strandtown, do.
Workman, Francis, The Moat, Strandtown, do.
Workman, John, J.P., Lismore, Windsor, do.
Workman, Rev. Robert, M.A., Rubane House, Glastry, Co. Down
Workman, Rev. Robert, M.A., D.D., The Manse, Newtownbreda, do.
*Workman, Thomas, J.P. (Representatives of), Craigdarragh, Craigavad, do.
Workman, William, Nottinghill, Belfast
Wright, Joseph, F.G.S., Alfred Street, do.

Young, Robert, C.E., J.P., Rathvarna, do.
*Young, Robert Magill, B.A., J.P., M.R.I.A., Rathvarna, do.

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Stewart, Samuel Alex., F.B.S. Edin., A.L.S., Belfast Museum,	do.
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Wright, Joseph, F.G.S., Alfred Street,	do.

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Thompson, John, J.P., Mount Collyer,	do.

Report and Proceedings

OF THE

BELFAST

Natural History and Philosophical Society

FOR THE

SESSION 1906-1907.

BELFAST:
PRINTED BY MAYNE & BOYD, 2 CORPORATION STREET.
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Belfast Natural History and Philosophical Society.

ESTABLISHED 1821.

CONSTITUTION.

The membership of the Society consists of Shareholders in the Museum, Annual Subscribers (Associates), Honorary Members and Honorary Associates.

Shares in the Museum cost £7 each. A holder of one Share pays an annual contribution of ten shillings ; a holder of two Shares (in one certificate) an annual contribution of five shillings ; while a holder of three or more Shares (in one certificate) is exempt from annual payments. Shares on which the annual payment as above are in arrear are liable to forfeiture. The Council retain the right to decline to consolidate two or more share certificates into one certificate.

Annual Subscribers (Associates) pay £1 1s (one guinea) due 1st November in each year in advance.

A General Meeting of Shareholders in the Museum is held annually in May or June, or as soon thereafter as convenient, to receivc the Report of the Council and the Statement of Accounts for the preceding year, to elect members of Council to replace those retiring by rotation or from other reasons, and to transact any other business incidental to an annual meeting. Shareholders only are eligible for election on the Council.

The Council elect, from among their own number, a President and other officers of the Society.

Each Member has the right of personal attendance at the ordinary lectures of the Society, and has the privilege of introducing two friends for admission to such ; and he has also the right of access to the Museum and Library for himself and family residing under his roof, with the privilege of granting admission orders for inspecting the collections in the Museum to any person not residing in Belfast or within five miles thereof. The session for lectures extends from November to May.

The Museum, College Square North, is open daily for the admission of visitors, for such hours as the Council may from time to time decide ; the charge for admission to non-members is sixpence each. The Curator is in constant attendance, and will take charge of any donation kindly presented to the Museum or Library.

Any further information required may be obtained from the Honorary Secretary.

BELFAST
NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.
SESSION 1906-7.

13th November, 1906.

ADDRESS BY THE PRESIDENT, SIR OTTO JAFFE, J.P.

WEIMAR AND ITS ASSOCIATIONS WITH GOETHE AND SCHILLER.

(Abstract).

SIR OTTO JAFFE, after thanking the Council of the Society for electing him as their President, said his daily occupation did not allow him to apply himself to any of the higher studies of science, much less to research work, and he concluded that it would perhaps interest them if in his inaugural address he dwelt on the associations of Goethe and Schiller with the town of Weimar, which he had the pleasure of visiting on his last holiday. The streets which they now passed through in Weimar were not the streets used by Goethe and Schiller in their daily walks during that unique friendship, and there was very little romance about the place. But Weimar was hallowed by the memory of the two great friends who lived and worked there, and whose influence it was even yet impossible to adequately estimate. Goethe was born in 1749 in Frankfurt-on-Maine, and at an early age he seriously occupied himself with lyric poetry and art studies. His father had intended him for the profession of the law, but Goethe was adverse to this, and he decided to devote himself whole-heartedly to literature. With the appearance of "The Sorrows of Werther" his reputation was made for ever. On attaining his

majority in 1775 Prince Carl August invited Goethe to Weimar, Goethe accepted the invitation. He arrived in Weimar in November of the same year, and for fifty-seven years he made Weimar his home. Honours soon came to the poet. He was given a seat in the Council, and Prince Carl offered him every encouragement in his literary studies. Goethe worked unceasingly. His State duties made great demands on his time, and soon he became indispensable to the Prince, under whose protection he had placed himself. Sir Otto having briefly referred to Goethe's literary labours, said it was as a man of science that he proposed to speak of him that night. Goethe did not occupy himself in scientific studies as an amateur. Early in 1784 he discovered the intermaxillary bone in man. In his studies in this direction he was not only guided by the true philosophic conception ; he was also led to the true method of demonstration—namely, comparison of the various modifications which this bone underwent in the animal kingdom. In other words, Goethe was the true forerunner of Darwin. It was the unity in nature, which at that time was to a large extent only a poetical idea, that guided Goethe in his treatise on the metamorphoses of plants. The care of his cottage garden led him to the study of plants, and he soon found himself attracted to wide generalisations. Goethe clearly saw that all the different parts of plants, except the stem and the root, might be regarded as modifications of the leaf; that leaf, calyx, corolla, bud, pistil, and stamen were all referable to the same type, and that whether a plant produced leaves, flowers, or fruit depended on the differentiation of the nutrition which it received. He was less fortunate in his theory of colours. "Farbenlehre" his attempts to prove that Newton was wrong, led him to many ingenious experiments, but as he was no mathematician the result of his labours in this direction were of no practical result, so artists admired him, but most men of science ridiculed his persistence. When Goethe was 82 years of age he still published an essay on "The Tendency of Plants to Spiralforms;" and at the age of 83 he wrote an essay on "Rainbows." In his old age Goethe was not spared the pains and sorrows of life.

His friend Schiller died in 1805; in 1816 he (Goethe) lost his wife, and thirteen years later the Grand Duke Carl August was laid in his grave. Goethe did not long survive his protector and friend. On March 16, 1832, he contracted a cold. Six days later he walked about his room for a short time. At noon he asked his servant to open an additional shutter, and half an hour later he passed away, his last words being "Mehr Licht."

"Mehr Licht."

Rev. Dr. Hamilton, President of Queen's College, in moving a vote of thanks to Sir Otto Jaffe, said that they had known him for a long time, and some of those present doubtless recalled his excellent father, who occupied a very high place in the commercial life of the city, and who was widely respected and gratefully remembered. It must have cost Sir Otto a great deal of trouble to prepare the excellent address he had delivered, but they had the satisfaction of knowing a good deal more of Goethe and Schiller than they did before. The President of the Society,

as Lord Mayor and as High Sheriff of the city, had worthily maintained the traditions of those high offices, while his interest in the public health was widely known and deeply appreciated. He had also shown the deepest interest in the higher education of the people in a manner which would cause his name to be held in the highest honour, not only in Queen's College, but all over the province of Ulster.

REV. R. H. BRETT seconded the resolution.

MR. JOHN M'CORMICK, in supporting the motion, said the lecture would have the excellent effect of stimulating their interest in the two great German poets whose lives had been so ably pourtrayed. With regard to Sir Otto Jaffe's public life, he had always been distinguished by a very high sense of duty, and also by the disinterested manner in which he acted as a representative of the citizens. It was indeed a revelation to one who only knew the President in that capacity to have a glimpse of the other side of his character, and to find that in the midst of commercial pursuits and onerous duties of various kinds he took a keen delight in poetry, and that he had a profound reverence for the great poets of the world. If this spirit were more largely developed in the hearts of public men a great advantage would accrue to the community.

The resolution was carried amid hearty applause, and the compliment was briefly acknowledged by the President.

Subsequently a special meeting was held, when a formal resolution authorising the Hon. Treasurer to end the financial year on 31st of May instead of 30th April was adopted.

4th December, 1906.

Mr. John Horner in the Chair.

MUNICIPAL PROGRESS AND RECENT WORKS IN AUSTRALIA AND NEW ZEALAND.

By J. T. Noble Anderson, B.A., B.E., M.I.C.E., M.Am. Soc. C.E.,
Past President Inst. Engrs. (V).

(Abstract).

To form an adequate conception of what these works are and how marvellous has been the progress of the principal colonial cities, no better standard for comparison can be chosen than this City; Belfast. Such a comparison need not cause any misgiving, because while this city can hardly vie with its younger sisters in the brilliant achievements which they have to display, it need not concede anything in pride of place, for steady and solid progress under the most adverse conditions; and alike with them is a splendid monument to the energy and ability of our race.

Going back to the beginning of the Victorian era—historical pictures were exhibited of the wild nature life and the few bark huts which peopled the present site of Melbourne. These were followed by views taken on the accession of King Edward, showing a city, which for all the conveniences and amenities which make life pleasant for her citizens, is probably unsurpassed in the world. Beautiful parks in the heart of the city, and lagoons covered with pleasure boats in the nearest suburb shewed the people disporting themselves, as well as the views of the watering places along the sea shore in the more distant suburbs.

Glimpses were also given of the Theatres, Cathedrals, and Hospitals. Then Sydney was briefly referred to. It may well be called the Queen City of the South, and in all the world has no rival for its harbour.

Here in the brief period of 17 years which have elapsed between the lecturer's first and latest visit to it, more than two hundred thousand (200,000) inhabitants have been added to its population.

As compared with our city, it must be remembered that these young places have the buoyant hope of youth, and with an unbounded confidence in the future they have carried out their public works and laid out their cities and parks on a scale which elsewhere would be regarded as not extravagant but wildly mad. When, however, it is remembered that Melbourne and Sydney are by nature the main emporia of a country equal in extent and agricultural possibilities to France and Spain combined—and probably superior to them in mineral wealth and other natural resources—it will not be wondered at that the purses of the empire have opened freely, and while the expenditure on their public works has been more than double in almost every direction than it has been in this city, they yet enjoy an immunity from the high rate which even here presses so heavily.

The Melbourne city's total rates are less than those of Belfast. One cause of this is the high valuation of the properties and the lands, owing to the attractions of town life for the wealthy class, which the wonderful material prosperity of the country has created. Another cause of the higher valuation is that public confidence in the future of the city makes property almost a liquid asset.

The concentration of population to the cities is largely due to the wide distribution of wealth, but is also due to the protectionist policy, which has fostered town industries. And in no part of the world is so large an urban supported by so small a rural population. The urban population actually exceeds the rural in numbers.

And in the case of Melbourne and Sydney these two cities contain a population of considerably over one million, while their two states only number two and a half millions.

Kipling voices a popular fallacy when he attributes this marvellous growth of town population to the effect of droughts.

On the contrary the awful and devastating droughts to which the interior of Australia is so liable has the effect of driving the population from the rich pastoral industry of the interior to the agricultural industry of the well-watered coast districts. And the agriculturalist and agricultural laborer feed the small rural village rather than the large town.

Illustrations were given showing the various types of employment in the towns and country, and the contrast between New Zealand, where the population is mainly agricultural, and there are no really large cities, with Australia was shown by illustrations of the beautiful cities of New Zealand.

The Municipal enterprises of both places were then elaborated. The wonderful water supply provisions, which have entailed reserves of land measured by the hundreds of square miles in the best forest ranges of the country, were detailed, and views shown of some of the reservoirs.

Among other the vast new cataract reservoir on the Nepean River from Sydney was shown—a reservoir with a masonry dam of 200 feet high, and containing a water storage of more than one hundred times the capacity of all the storage reservoirs of Belfast.

These figures, however, give but little idea of the civilization and advancement of the cities. The contrast, coming from such a town as Melbourne, where almost all the streets are paved with hard wood or tarred macadam, or similar clean roadway, and where the water supply and sewerage works have cost over 8 millions pounds, to our city, where the traffic still jolts over granite sets and cobble stones, and where the harbour still casts up the effluvia of the city, and the obsolete ashpit still makes the back lanes abominable, is simply revolting.

At the same time it would give an entirely false impression if this contrast were taken as meaning that life in the colonies was an easy one, with every modern facility to luxury, with a cheap and frequent tramway service, and with pleasure boats and ferries always crowded.

These are, it is true, the privileges of the town inhabitant, whose wages are high and whose holidays are compulsory and frequent. But on the other hand most of the money is earned in the country. Here were shown pictures of the work in the fields and the forest. And the country "dirt roads," with the carts bringing the milk to the creamery or butter factory were contrasted with the magnificent streets and immense cold storage markets of Melbourne.

NEW ZEALAND.

Then the lecturer displayed a large number of views of New Zealand scenery. Some of the West Coast Sounds bore a remarkable resemblance to the Fiords of Norway, only that the glacier clad mountains were not only higher but also steeper and more graceful in outline than any in the Scandinavian peninsula, while the great lake district recalled Switzerland, except that the lakes are larger and the scenery generally more open and expansive.

The photographs were unusually clear in outline, a circumstance which he attributed to the extreme dryness of the atmosphere, described as bracing and "invigorating as wine." As an example, Mount Cook, the Mount Blanc of New Zealand, can be clearly seen in all seasons of the year for a distance of 150 miles.

Turning then to works in New Zealand, these are naturally of a very different character from those in Australia. The railways and roads call for great feats of engineering and skill, as witness the photographs he showed of bridges across steep gorges and tunnels under great mountain ranges, with centre rail tracks where special locomotives haul ordinary trains up gradients of 1 in 15. From a municipal standpoint, the chief difference between New Zealand and Australia lies in the fact that New Zealand has 4 or 5 competing sea ports, and consequently has 5 centres, all within 200 or 300 miles of each other, and no one of which directly serves a larger area than say Dublin.

Owing too, to the rugged nature of the greater part of the country,

and the vigorous military character of its native Maori population it was not until 1840 that the white population settled there, and generally speaking the settlement has been nearly 50 years later in New Zealand than Australia, with the result that while it has a greater area than the whole of Great Britain, and contains much, of probably the very best, agricultural land in the world, with such a climate as is enjoyed by the Channel Islands and the West of France, it yet has up to now rather less than one million inhabitants.

Dealing with the character of the former inhabitants, the lecturer exhibited the remnants of a cannibal feast which he had discovered near Dunedin.* And then he went on to describe the enterprise of the municipalities, which in their way and in proportion to their size is perhaps more remarkable even than Melbourne or Sydney, picking out for illustration that one which he himself had served during the last few years—namely, Dunedin.

Here with a population including suburbs of only 60,000, over 100 million pounds has been spent on the Harbour, the Water Supply, the Tramways, the Sewerage, and the Municipal Gas Supply, and yet the rates aggregate less than 3s. in the pound on the annual valuation.

Views of the sewerage works, which the lecturer designed and constructed, were then exhibited, and among 'up to date' features were shown the various ferro concrete methods adopted in pipes and aqueducts, the former including the main sewer, with pipes of 5′ 6″ internal diameter.

Also the rising mains constructed of best Australian Hardwood, which has been proved even more durable than cast iron, and can be constructed into large water and sewer pipes to carry internal pressure at a fraction of the cost of the heavier material.

While the centrifugal engines, driven by a pair of Diesel oil engines, each developing up to 200 indicated horse power, were shown, and these are of interest as being the very first of their kind that ever crossed the equator or worked in the Southern Hemisphere.

* These are now included among the objects lodged in the Society's Museum.

8th January, 1907.

Sir Otto Jaffe, J.P., President, in the Chair.

REPRESENTATIVE MODERN PAINTERS.

By James Taylor.

12th February, 1907.

Sir Otto Jaffe, J.P., President, in the Chair.

THE NORSEMEN IN IRELAND.

By S. F. Milligan, M.R.I.A., F.R.S.A.I., J.P.

22nd February, 1907.

Sir Otto Jaffe, President, in the Chair.

OFFER OF THE SOCIETY'S COLLECTIONS TO THE BELFAST CORPORATION.

Special meeting of the members of the Belfast Natural History and Philosophical Society held in the Museum, College Square North. About thirty members were present, and apologies were read from Sir James Henderson, D.L., and Mr. James Moore.

Mr. J. Brown wrote regretting that business in England prevented his attendance at the meeting. He again expressed his sorrow if there were not among themselves sufficient interest in the Society and its objects to wish to keep what was, he presumed, the finest and most valuable private collection in the country.

He regretted that there seemed to be no one to take the moderate amount of trouble commonly found necessary in all such societies in order to keep them alive at all. The Field Club employed such means, and was a living and working Society. There was plenty of money in Belfast for such purposes, as they had found already.

He doubted if the city wanted the collections, and thought it would be much more dignified and self-respecting not to throw them at the Corporation's head.

On the proposal of Sir Otto Jaffe, seconded by President Hamilton, the following resolution, after full discussion, was passed :—

" It being considered desirable that in the interests of the public the Corporation of the City of Belfast should become custodians of the specimens in the Museum of the Belfast Natural History and Philosophical Society, the said Society is prepared to grant this on the following conditions :—

"(1) That the Corporation of the City of Belfast act as custodian to the Council of the Museum buildings and premises and the collections and specimens and the cases containing the same, excluding books, manuscripts, pictures, busts, and furniture.

"(2) To keep the buildings and their contents in good order and condition and properly insured.

'(3) To pay the necessary working expenses of the Museum and the cost of Management of the same.

"(4) To give the public access to the Society's collections in accordance with rules to be framed by the Corporation; and

"(5) To make convenient arrangements for the use of the Museum buildings for the purpose of lectures and other meetings, held with the object of promoting learning and research in the arts and sciences and in history and literature, it being understood that any rents received for such uses shall belong to the Council, who shall pay the head rent and taxes.

"The Council hereby express their assent to the proposal, and agree to permit the Corporation of the City of Belfast to become custodians of the Museum premises in College Square North, and the collections, specimens, and cases, for the purpose and on the conditions above set forth.

"This arrangement may be brought to an end either by the Council or the Corporation by either giving the other twelve months' notice in writing, such notice, if proceeding from the Council, to be served on the Town Clerk, and if from the Corporation to be served on the Secretary of the Council.

2nd August, 1907,

A Special Meeting of the Members was held "To consider the advisability of proposing a modification of the terms on which the collections of the Society are to be offered to the Belfast Corporation, making it a permanent loan." About 20 members were present and it was resolved to offer the collections as a permanent loan.

12th March, 1907.

Professor Johnson Symington, M.D., F.R.S., F.R.S.E., in the Chair.

SOME GERMAN EDUCATIONAL METHODS AND IDEALS.

By James Alex. Lindsay, M.D., F.R.C.P. (London).

(Abstract).

By universal consent education had been managed in Germany with conspicuous success Germany had an educational system which was an organic whole, which was fully articulated and completely co-ordinated, and which satisfied both her needs and her aspirations. The secrets of the success of German education might be summarised as follows :—

(1) Education in Germany had been exhaustively studied as a speciality.

(2) Education had been pursued in that country for its own sake and for its own legitimate rewards.

(3) Sectarian difficulties had been, on the whole, slight.

(4) A strongly-centralised national administration had interested itself actively in education and given the cause of education generous support, while at the same time local control of education had been efficient, and municipalities had risen to the height of their duty in this matter.

(5) Education had been kept cheap, partly owing to the moderate standard of living in Germany, partly to the willingness of able men to work on low salaries.

(6) Competition amongst the various areas of the German Empire had been healthy, and has not excluded co-operation for important ends.

(7) The German universities had known how to combine successfully the work of teaching and the work of research, so

that this latter function had not been handed over to Academies—as in France, or to Societies, such as the Royal Society or the British Association—as had happened to a certain extent in the British Islands.

The leading feature of German education was the systematisation of the various departments. The primary school, the secondary school, the high school, and the university had a definite relation to each other; they subserved certain clearly-defined ends, they were links in a chain, they were graduated steps in the ladder of learning, they did not overlap or leave mischievous lacunae. In a German town the number of schools was accurately apportioned to the number of scholars and their educational needs, not to the private opinions or sectarian prejudices of the parents. Large schools were favoured, as being more economical, more efficient, more likely to be capably manned and vigorously administered than small schools. In Wiesbaden, a town with about 100,000 inhabitants, there were 16 schools—five high schools, three middle-grade schools, and eight elementary schools—*i.e.*, one school to every 6,200 inhabitants. Belfast had about 320 schools for a population of about 380,000 inhabitants—*i.e.*, one school to every 1,200 people. This meant undue multiplication of schools, unhealthy competition, weak administration, and inefficiency. Many of the Belfast schools were small, badly built, badly ventilated, imperfectly provided with class-rooms, playgrounds, and sanitary requisites, weakly manned, and either sparsely attended or over-crowded.

Germany differentiated schools as regards their aims and scope on a fixed principle. The same school did not attempt to compass divergent educational ends, as was so often attempted, with indifferent success, in this country. These were the following types of school, viz.—

(1) The Gymnasium, where Latin and Greek were the main subjects.

(2) The Real-Gymnasium, where Greek disappeared in favour of English and a more liberal course of science.

(3) The Reform Real-Gymnasium, in which language teaching began with French.

(4) The Real-Schule or Modern School, in which Latin and Greek disappeared, and the teaching was based on modern languages, science and mathematics.

(5) The High School for Girls.

In Germany the schools were well housed, and the municipalities, which in general owned and controlled the schools, showed much liberality to the cause of education. Great care was taken regarding the hygiene of schools and the health of the scholars. Medical inspection of schools was the rule, the schools being in many cases visited weekly by a doctor. The children were periodically measured, and the height of the desks regularly adjusted to the height of the scholars. School baths were provided for day scholars. Instruction in school hygiene was compulsory for teachers in some of the German States. The German schools were very cheap, and the teachers had a position of dignity, independence, and modest competence.

Technical education had made great strides in Germany in the last 70 or 80 years. Technical schools of a high order existed in Berlin, Dresden, Munich, Augsburg, Nuremburg, Stuttgart, Darmstadt, Brunswick, Hanover, Carlsruhe, and elsewhere. The school at Charlottenburg was the premier institution of the kind in the world. Technical instruction included the training of architects, civil engineers, mechanical engineers, and technical chemists. Darmstadt and Carlsruhe had a special department for electro-technology, Berlin a special division for shipbuilding and marine-engine construction, Brunswick for pharmacy, Carlsruhe for forestry, Munich for agriculture. The relation of the technical school to the university was a point of great importance. This relation should be close, and mutual co-operation should be cultivated.

The German university system was worthy of special study, its success being undisputed. A university had four objects, viz.—

(1) To teach, to diffuse knowledge.

(2) To promote research.

(3) To promote philosophic culture—*i.e.*, to link departments of knowledge together, to enable the student to realise their

mutual relation and inter-dependence, and to assist him to form a working theory of the world, life, and conduct.

(4) To prepare candidates for the various professions.

In order that universities should fulfil these ends the following conditions were necessary—viz. :—

(1) They should be so situated as to be readily accessible to the student.

(2) They should be suitably endowed, so that they could give the best education at a cheap rate.

(3) They should enjoy the fullest measure of autonomy, and be in accord with local needs and local sentiment.

(4) They should enjoy complete liberty both to learn and to teach, and should own no allegiance but to truth.

Germany had 22 universities for a population of about 50 millions. The universities were distributed generally throughout the Empire. Germany had never made the mistake which had resulted so disastrously in France—of trying to centralise university education. Centralisation of university education in a capital city meant the intellectual sterilisation of the provinces. The multiplication of universities within reasonable limits had worked well in Germany. The state was generous to universities in Germany, contributing 72 % of their income, while 9.3 % was derived from fees, and the balance from private endowments. The German universities were in large measure self-governing, but the Crown in most cases appointed the professors from names submitted to it by the governing bodies of the various universities. Teaching was, in general, excellent in quality and free from any restrictions. In some universities—*e.g.*, those of Bonn and Breslau, dual chairs had been founded in history and philosophy as a means of escape from the sectarian difficulty. Privat-docents were one of the striking features of German universities. This system worked well in Germany, but its suitability to the needs of England or Ireland was doubtful. Specialisation was carried to great lengths in the German universities, and its results had been in the main beneficial.

German educational methods were eminently instructive as

examples, but it did not follow that they should be adopted in other countries without much consideration.

Mr. J. Finnegan said the discussion ought to be useful, as it is the wish of several to centralize university study and compel Ireland to go through the mistakes made in England and France before we get a real system of University Education.

In France the plan of a National University was tried and failed, its 21 Universities disappearing at the Revolution, one University took their place, with faculties in different parts of the country, the general result was barrenness and decay in intellectual life, and the re-establishment of 13 Universities in 1895.

The influence of German Universities in the country and the world is extraordinary, the number of students at Berlin alone is as great as at Oxford and Cambridge combined.

They constitute a world in themselves, and docents continually migrating from one to another, each University tries to attract the best talent to its own staff and thereby increase the number of students.

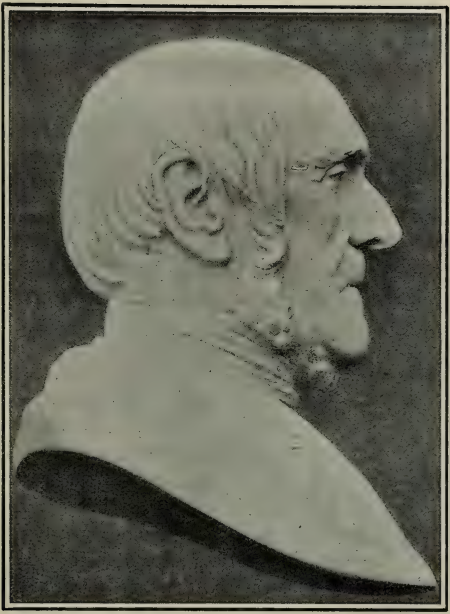
The distinctive value of the German University lies in the fact that they supply an environment in which the best teaching talent can be developed and every capability of the student satisfied.

Into this environment advancing science easily finds an entrance, the higher vocation of eminent men is recognized, and the poorer lives of common men receives an increased appreciation of existence.

Professor Meissner observed that from the stand-point of a German nothing appeared more surprising than the proceedings of the various Commissions taking evidence on the University Question. Practically the same persons were invited to give, or volunteered to give, their opinion before each succeeding commission. In Germany no one would ever dream of asking any of these people for their opinion on University Education and if they went to offer it, it would be received with the greatest contempt. As to a federal university, the plan had been tried in London and the Victoria University. In Ireland the attempt had

been even more disastrous. In England a mere examining board had a large number of capable men to chose from as examiners, but in Ireland a more limited number was further reduced by religious and other considerations, so that the appointment of examiners, irrespective of their qualification, was the result. He himself had had the misfortune of having as fellow-examiners several most illiterate persons.

Mr. J. Brown said he had listened with great interest to Professor Lindsay's clear, and complete description of the German educational system. No doubt it was excellent, and, without wishing to detract from it at all, he might point out that however well planned it was towards the aim of education—the production of capable men by the formation of mind and character—it had not turned out men of such capabilities as had our haphazard English ways. One could consider the great lights of English science, literature, and Engineering. They stood above all the world in quality and quantity of their work.



ALEXANDER MITCHELL, THE FAMOUS BLIND ENGINEER OF BELFAST.

By Francis Joseph Bigger, M.R.I.A.

(Abstract.)

The earliest account I can find of the Mitchell family is in an old quarto Bible, where it is written that George Mitchell was born in November, 1711, in Edinburgh, and landed in Ireland in 1733, settled in Dublin, and married Mary Wasson in 1742. She was the grand-daughter of Brice Blair, Presbyterian Minister, who

was an important character during the early struggles of his Church at that time, as recorded in Reid's "History of the Presbyterian Church." The family was proud of this connection, and have an old table spoon with "Brice and Margaret Blair, Belfast, 1683, engraved on it. Subsequently Alexander Mitchell always worshipped with the old or first congregation in Rosemary Street.

All the children of George and Mary Mitchell died young, except two, William and Mary Isabella. William was the father of Alexander, the subject of this memoir, and Mary married a Stewart, of Ballydrain, near Belfast.

Alexander, the eighth son, was born in William Street in Dublin, on the 13th of April, 1780, and remained at Clontarf till joined there by a younger brother, Arthur.

After the death of George Mitchell, senior, in 1787, when Alexander was seven years old, his father removed his family to Pine Hill, near Belfast. From this place Alexander went to school for the first time, in his eighth year, to learn writing and arithmetic, having been taught reading and spelling, &c., by his mother.

A few years later the establishment at Pine Hill was broken up. Most of the furniture, the horses, musical instruments (among them a harpsichord that had been Lord Mornington's, and a real Cremona violin) were sold; and last, and most regretted, a number of curious old books, one of Caxton's printing, and others more valuable, if not so rare.

Mrs. Mitchell, with her three youngest sons and her only remaining daughter, rented a pretty cottage, a mile from Belfast, which suited her altered circumstances. The house, though small, was comfortable, with a small garden and lawn; the place had belonged to Barry Yelverton, afterwards Lord Avonmore, and by him named Eglinby Cottage.

From this home Alexander attended the best classical school in Belfast, conducted by Dr. Bruce, a scholar of high attainments. But here his sight, always defective, declined rapidly, being especially injured by the Greek alphabet; so that in his sixteenth year he could no longer read, and in his twenty-first year was obliged to forego letter-writing.

Mitchell seems to have enjoyed his school life at the Belfast Academy under Dr. Bruce for about four years, having gone there at the age of ten or eleven, and acquired a good deal of learning in spite of failing sight. Towards the end of this time Dr. Bruce was puzzled by the irregularity of Mitchell's handwriting and his difficulty in reading, but, after finding the cause, was careful to make the boy's work as easy as he could. Mitchell spoke afterwards with gratitude of the consideration shown him by the doctor, who was otherwise a master of the strict old school.

Before he was sixteen years old, Mitchell's sight had become so bad that he could not see to read, but it would seem that he had already stored his memory so well as to give him pegs on which to hang much that he gained afterwards from reading and conversation. His family constantly applied to him for help in geography, history, counting, and even spelling.

We have little record of his doings after this, until the year 1798, memorable in Ireland as the year of the Insurrection. His cousin's daughter, Mary Williams, tells how her mother, then quite a girl, with her two sisters, three handsome young Miss Fergusons, were hastily sent off in a sail boat to Portpatrick and on to friends in Scotland, to be out of danger, taking with them their young cousin, Alexander Mitchell, then 18.

Very near to Eglinby Cottage there lived in what had been part of the Yelverton pleasure grounds Mr. and Mrs. Banks, with their only child, a daughter.

Alexander Mitchell married Mary Banks in 1801, when he was 21 and she two years older, and his mother was so greatly displeased with him, for what she doubtless considered a rash act, that for more than a year she would not see him. She however became reconciled after the birth of the first child, a boy, and was afterwards visited and loved by all her five grandchildren, up to the time of her death, nineteen years later. One can understand the reconciliation to have been complete, from the sense of relief she must have felt in seeing that her son had a wife so entirely devoted to his interests, and so full of practical common sense.

His appearance was that of a strong and active man. He

was over six feet in height; upright in figure, with broad shoulders. He had a strong and thoughtful face, expressive features, clear gray eyes, which hardly suggested blindness, as he turned to those he talked to, and seemed to look at them. His blindness was caused by amaurosis, that is paralysis of the nerves of the eye. Possibly his sight may have been overstrained in his childhood, as I remember his telling how he and a brother used to lie on the floor of the hall in Dublin, reading by the dim light that came rom the street lamp, through the fanlight over the door.

Shortly after, he commenced the manufacture of bricks, on his very slender patrimony he being the youngest but two, in a family of thirteen children. This business he carried on with moderate success for about thirty years, at the same time indulging his taste by many mechanical experiments.

The house in which Mitchell lived, and where his five children were born, was a small square two-storied cottage, with a fruit and vegetable garden on the right, and a curving drive on the left, which led out to a suburb of Belfast called Ballymacarrett. The house lay between the Newtownards and Albert Bridge Roads, near the present Ropeworks.

When in his fifty-second year, a friend who had constructed a dock in Belfast requested Alexander L. Mitchell to consider how he could connect with it a plan for the repair of vessels of moderate size, which should be neither a dry dock nor a patent slip, but which should cost little, occupy but little space, and be worked at small expense.

This plan Alexander Mitchell perfected and patented in 1833, the screw pile and screw mooring being essential parts of the work. He was at this time in his fifty-third year, and entirely without the use of sight.

In 1837 he became an associate of the Institution of Civil Engineers, during the presidency of the late Thomas Telford; and in the year 1848 was elected a member, when he received the Telford medal for a paper prepared for the occasion.

In 1847 he had procured a renewal of his patent for fourteen

additional years, a circumstance almost without precedent, testimony having been given in its favour by all the principal engineers of the day.

A dock on the plan above alluded to has never yet been constructed, but the screw pile and screw moorings are now extensively used in many lands, a new and valuable principle being afforded by their means to engineering enterprise.

The foundation of the first lighthouse was put down in the summer of 1838, on the Maplin Sands, a very unstable bank near the entrance of the Thames, for the Corporation of Trinity House of Deptford and Stroud. This foundation consisted of nine wrought iron piles, with a four feet screw at the foot of each, placed in the form of an octagon, with one in the centre, and screwed into the bank to the depth of twenty-two feet, in nine consecutive days. But the first house of the kind that was lighted was at Fleetwood, on Wyre. The lighthouse was planned and executed from his own design, by himself, with the assistance of his son, during the winter of 1839.

After that time Alexander Mitchell, with the assistance of his son, applied the same principle to the building of lighthouses, piers, beacons, etc. In 1862, Mitchell, being in his eighty-second year, retired from active life, but had the satisfaction of knowing that his screw piles and moorings were conferring important benefits on India and on America, both North and South.

One autumn there were some very stormy days, and in the twilight hour as he lay resting on the couch, during intervals in the almost constant reading, he pondered much on the trials of shipwrecked men, and pictured their difficulties as he listened to the wind that raged round the cottage. He said that he set his mind determinedly to work to think out some means of warning for ships that are in danger from rocky shores.

In 1832 his thinking brought him some very original ideas, and one of them he carried out with the help of his son John, then a lad of about 19.

This son afterwards described the first experiment as of a most exciting nature. As the evening dusk came on he and his father

set off secretly, with the new instrument packed up and hidden away. They arrived at Dunbar's lock and hired a boat, but dismissed the boatman. John rowed his father over to a sandbank, and there they screwed down a model screw pile, leaving the post standing above water, and taking the bearings of its position.

Very early next morning, before the working world was astir, they rowed out again, examined the pile, and found it was firmly fixed where they had placed it. That must have been a moment of great satisfaction to both. In fact that night's experiment laid the foundation of Mitchell's success as an engineer.

The following is an extract of the evidence of Alexander Mitchell, taken from the report of the Select Committee of Parliament on lighthouses:—

14th July, 1845.

"I am a civil engineer, and reside in Belfast. I have carried on my profession for about twelve years. I have been employed in erecting lighthouses on the coast of Ireland, upon the screw pile principle, of which I am the inventor and patentee. When erecting the lighthouse on Maplin Sands I experimented on the very ground where the lighthouse now stands. We always think it necessary everywhere, before undertaking any work of the kind, to ascertain as well as we can the nature of the ground, in order to proportion the size of the screws to the nature of the ground, and to the depth to which we are likely to penetrate.

"I prepare a rod in the nature of a boring rod, of about 30ft. and one and a quarter inch diameter, and put a small screw at its lower extremity, of the same form as the screws we use in forming foundations, the screw having a flat, broad flange of six inches diameter. In a very short time, say 15 or 20 minutes, by means of four cross levers upon the boring rod, we screw it down to the depth of 27 feet; so far as we found the ground penetrable.

"Then the next thing we wished to ascertain was, what weight that would support without sinking. Upon the cross levers which we used in turning it down we placed a few boards, to form a platform, upon which we placed 12 men, whose weight might be a ton, and we placed another rod at a short distance, merely sticking

it into the ground, to ascertain the comparative level of the two; to observe whether the one with the weight upon it would sink.

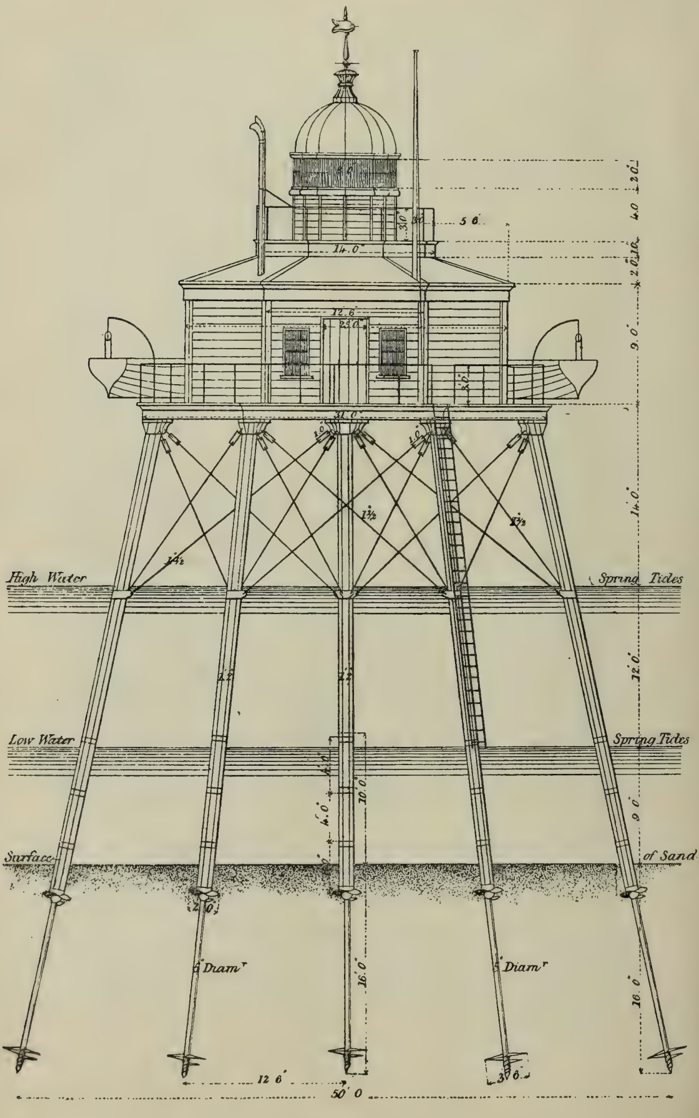
"After the men had remained a considerable time upon it, we found that it had not sunk in the slightest perceptible degree.

"It then became a matter of calculation, if a six inch screw would bear a ton at that depth, what a screw of foor foot diameter would support, that being the size we thought it necessary to use. It being eight times the diameter, that gives 64 times the surface; the circles being to each other as the squares of the diameter, the four-foot screw would consequently carry at least 64 tons; but James Walker maintained it would support much more.

"We give one single turn of the flange of the screw; we have found that most useful and practicable, because the holding power depends upon the breadth of the disc, and not on the number of turns, which only adds to the difficulty of getting it into the ground.

"The next lighthouse we erected was last summer (1844) in Carrickfergus Bay; it is intended to serve the double purpose of a harbour light and a pilot station. It was lighted in November, 1844. The platform is 33 feet, and the diameter of the house 26, the lantern 7½ or 8 feet. It cost £1,300, including the lantern and lighting apparatus. I was determined that Belfast should have the benefit of the invention, and I did not work for profit. That sum covered the whole expense of the materials and labour, as it was not inconvenient to build, being near my own residence, and it was rather an amusement than anything else. It has been well tried, having stood the storms of the last winter uninjured; and I may add that in tempestuous weather there are two heavy boats suspended to it from davits which the pilots residing there require for their use. These boats, belonging to the pilots, are suspended from the platform at each corner by a strong crane like the davit of a ship.

"As the pilots require two good strong boats, and fearing they may be swamped or stove in in stormy weather, they haul them up and suspend them by these cranes out of the water, above the reach of the highest wave, and then let them down, either the one or the other to the lee side, when they want to go on board vessels."


High Water
Spring Tides
Low Water
Spring Tides
Surface
of Sand
5" Diamr
5" Diamr
12 6"
50' 0
14.0
12.6
31.0
9.0
14.0
12.0
16.0
10.0
4.0
3.6

The following is an approximate list of the works done by Alexander Mitchell:—

1833—Experimental trials of screw mooring.

1838—Maplin Sands Lighthouse, Essex.

1839—Fleetwood Lighthouse.

1842—Kish Bank Lighthouse, Dublin.

1843—Beacon in same place.

1844—Belfast Lighthouse.

1845—Margate Beacon (Tongue Sands) and two beacons at Wexford.

1847—Courtown Pier, Gorey, Wexford

—Teignmouth moorings, Devon.

1848—Two Lighthouses in Dundalk Bay

1850—Sheerness Lighthouse, Kent, on Chapman Sands.

1851—Queenstown Lighthouse begun, finished April, 1852.

1852—Gunfleet Sand Lighthouse, Essex.

1854—Morcambe Bay Lighthouse.

1862—Seven Moorings at Kingstown, Dublin.

1863—Portsmouth Admiralty applied for more moorings for buoys

1864—Six moorings at Teignmouth, Devon.

—Three moorings at Kingstown, Dublin.

On the 22nd February, 1848, a paper by Mitchell on "Submarine Foundations" was read before the Institute of Civil Engineers, in London.

On the 20th of June, 1848, Mitchell was informed that he had been advanced from an associate to be a member of the Institution of Civil Engineers, and the Telford Medal was sent to him. It is a delicately finished silver medal,

Later in the year he went to Soldier's Point, Dundalk, to build two lighthouses in the harbour, and remained there with his family until the work was finished in 1849.

In 1850, Mitchell wrote a paper for the Literary Society on "Forest Trees," which was read there on the 21st of January, and an abstract of it published in *The Banner of Ulster.* There was generally a discussion after a paper had been read, and this Society

counted so many learned and talented men among its members that there was no lack of social enjoyment.

Early in this year, Mitchell built a lighthouse on the Chapman Sands, off Sheerness, in Kent. Having returned to Belfast he was treated with, regarding a lighthouse for the Cove of Cork. He sent in a proposal to build it for the sum of £4,450, which was accepted, and he moved to Queenstown about the end of November, in order to prepare for beginning the work early in the next year. During this Autumn Mitchell built a lighthouse on the Cunfleet Sands, near Essex.

In August, 1853, Mitchell went with his family to the pretty little village of Heysham, on Morecambe Bay, as he had undertaken to build a lighthouse there. His son had, meantime, been making arrangements for the work, and found the place where the lighthouse was to be built was more exposed than he had expected, so that two gangs of men were engaged, that they might be able to take advantage of every fine moment.

During spare time Mitchell thought out some improvements in the screw propeller, and got it tried in October, and patented early in the next year. It proved to be a great improvement on former propellers, and was a new source of income. But the success it had in working was a much greater satisfaction to him. It was first tried in the Erin's Queen and Malvina (called Mulvanly by the sailors !), and the captains both reported an increased speed and a smaller consumption of coal.

James Hamilton made a very complimentary speech at a meeting of the Screw Steamship Company, in which he said that "the company was under great obligations to Mr. Mitchell for his advice and counsel, and his generous kindness in granting to all their ships the free use of his improved screw propeller."

In the specification of patent for the improvements in propelling vessels Alexander Mitchell declared the nature of his invention to consist—" First, in a certain form given to the blades or arms of the screw propellers by means of which the water passes from the propeller when in motion in a dense cylindrical mass, and not scattered or broken as in the case with the ordinary propeller,

which by sending off a certain portion of the water centrifically at right angles with the axis, gives a violent vibratory motion to the entire mass of the ship and cargo, and thus subtracts materially from the propelling power of the engines"

In June of 1854 Mitchell left Heysham and went to Victoria Terrace, Holywood, for some months, four miles from Belfast, where he enjoyed the superintendence of a large garden of vegetables.

This was the year 1855 of the great Paris Exhibition, and a silver medal was awarded to Alexander Mitchell for the invention of the screw mooring.

On the 12th of April, 1858, a paper by Mitchell was read at the Literary Society on "Architectural foundations"

After his daughter Mary's death he joined Mrs. Burden's household, and her family stayed with him at Farm Hill, Holywood, until they all moved to Glen Divis in May, 1868. In this latter year a young Belfast sculptor, called Lynn, modelled a bust of Mitchell, but it was not thought so good as the marble bust that Shakspere Wood made when he came over from Italy several years before. This bust is now the property of Belfast, but was unfortunately discoloured by a fire in his grand-daughter's house.

On the 25th of June, 1868, Mitchell's life ended calmly and naturally in the presence of his beloved daughter and son-in-law. He was buried in Clifton Street Graveyard.

The lecturer expressed his indebtedness for information supplied to him by Mrs. Mary Garrett of Wynnstay Gardens, Kensington, London, widow of Thomas Garrett, formerly a Solicitor in Belfast. Mrs. Garrett is the only daughter of Alexander Mitchell's elder daughter, Margaret, wife of Dr. Wm. Burden, of Belfast. The lecturer expressed the hope that the bust of Mitchell now presented to the city would long serve to keep the memory green of one who had conferred a great benefit on humanity and shed a lustre on his native city of Belfast, of which he was one of the most famous engineers.

A series of drawings of Mitchell's work, and a portrait, were presented to the Technical School, Belfast, by the lecturer.

25th March, 1907.

Rev. Thomas Hamilton, D.D., LL.D., President Queen's College, in the Chair.

WASPS: A STUDY OF THEIR ARCHITECTURAL AND CONSTRUCTIVE ABILITY.

Popular Lecture Delivered by Rev. W. H. Dallinger, LL.D., F.R.S., F.L.S.

16th April, 1907.

Mr. John Horner in the Chair.

THE SCOTCH-IRISH IN AMERICA.

By The Hon. Samuel S. Knabenshue.

(Abstract.)

The most Irish city in the world is not Belfast nor Dublin, but Boston It has more inhabitants of Irish lineage than either—more even than New York, which is popularly supposed to be "run" by the Irish. In the United States the term "Irish-American" designates any resident who either was born in Ireland or whose ancestors came from the Emerald Isle. The majority of all who are Irish by birth or descent are to be found in the States. Omitting the Irish who emigrated earlier, since the potato famine of 1845 over 4,000,000 have gone thither, and the estimate that there are at least ten million Irish-Americans in our 85,000,000 population is certainly within reason.

The subject for immediate consideration, however, is not the Irish-Americans as a whole, but that section of Scotch ancestry. Viewed from the American standpoint, they are Scots who sojourned for several generations in the North of Ireland, and then sought new homes in the United States to secure religious liberty.

The thirteen original colonies of English-speaking people, which formed the nucleus of the present American Union of 46 States, formed a mere strip along the Atlantic seaboard. North and south along the coast it is about 1,000 miles. Westward, the settled portions reached to the Appalachian mountain system, some 200 to 250 miles. The most easterly range of this system is the Blue Ridge. Now, in this coastal strip there were four

localities which received the majority of the Scotch-Irish Presbyterian emigrants from Ulster. Of course there were Ulstermen among the settlers of all the 13 colonies, but the great movement was to these four localities.

The most northern of these ports of arrival was Boston. But the Scotch-Irish who arrived there either found the prevailing Puritanism uncongenial, or their racial instinct to be mountain-dwellers was overpowering. Or both may have been factors. At any rate the larger portion of them sought homes among the granite ridges of the hills—a region much resembling the Mourne mountain district in County Down. Here they founded the towns of Londonderry, in New Hampshire, and South Londonderry and Antrim in Vermont. Here their descendants dwell to-day—pious, God-fearing, and hard-working farmers, by hard labour wresting a scanty living from the rocky soil.

A smaller number landed at New York, but they found the Dutch atmosphere uncongenial, and settled in the hill country, giving the name of Ulster County to the area. Like the Irish province of the same name, Ulster County, New York, is famed for its butter, and furnishes to the metropolitan city a large share of its daily milk supply.

The largest migrations to both these localities were caused by the persecution of Protestants who would not conform to the Established Church. Many of these emigrants were of the men who defended the walls of Derry, and thus aided materially in establishing William and Mary on the British throne. Hated by the Roman Catholic Irish because they were Protestants, persecuted by the English because they were Presbyterians, they went to America to obtain the liberty denied them here. Their migration was Ireland's loss and America's gain.

The third centre of Scotch-Irish immigration in the Colonies was Philadelphia. The gentle Quakers interposed no objection to freedom of religious belief. So many Ulstermen arrived in the city of brotherly love that it became more of a Scotch-Presbyterian city than an English-Quaker one. And one of them was James Logan, of Lurgan, who accompanied William Penn in

1699. But the love of the hills was in their blood, and they went westward, into the valley over the Blue Ridge. Thousands of German Lutherans went over in the same period, and also moved into the valley. But about 1730 Logan, the then governor of the colony, enforced some laws that were so offensive to both Presbyterians and Lutherans that great numbers of both left Pennsylvania, following the valley west of the Blue Ridge, across the narrow strip of Maryland, and entered Virginia. The Germans settled along the Potomac River. The Scotch-Irish pressed farther southward, and settled in the upper or southern end of the Shenandoah Valley—a region topographically much like the Ards of County Down.

The fourth locality favoured by the Scotch-Irish settlers was that of North and South Carolina. True to their liking for the mountains, they did not linger in the level coastwise country, but pressed on until they reached them. This entire mountainous region from the northern boundary of Georgia up to the northern portion of Virginia was peopled by the Virginia and Carolina immigrants and their descendants. And these Scotch-Irish have been great as pioneers. They filled these mountain valleys, and then pressed through Cumberland Gap to settle Kentucky. Farther South they found their way across into Tennessee. The city of Knoxville, in the eastern part of that State, in its name, commemorates its founder, a Scotch-Irishman. Lewis and Clark, who led the first expedition which crossed the continent, were both Scotch-Irish. And to-day men of this blood are prominent in every line of human endeavour in the United States.

The Scotch-Irish have so far given the United States a very large percentage of statesmen and warriors. Of the 25 Presidents of the United States, six are undoubtedly of Scotch-Irish descent—Jackson, Polk, Taylor, Buchanan, Arthur, and M'Kinley. I had the honour of acquaintance with the latter, who frequently referred humourously to his descent by remarking, "As we Irish say." His ancestral home, as undoubtedly you all know, was at Dervock, County Antrim, a few miles from Ballymoney. President Franklin Pierce is claimed as a Scotch-Irishman, but it seems more probable

that his ancestry was English. Three Presidents were of straight Scotch ancestry. General Grant was a descendant from some one of the great septs of the house of Grant. James Monroe was another Scotchman, and so was R. B. Hayes. Two others had Scotch mothers. Two were of Dutch descent from the male line—Van Buren and Roosevelt; but the latter is descended on his mother's side from the (Scotch) Dumbartonshire family of Bulloch.

It would take a list as large as the Belfast City Directory to name the men in America noted in politics and in arms who came of Scotch-Irish descent. A few may be mentioned—General Knox, an officer in the Revolution, and the first Secretary of War in Washington's Cabinet; Wilson and Iredell, associate justices of the first bench of the Supreme Court; John Rutledge, the second man to be made Chief Justice of that tribunal—the highest court in the United States; Daniel Webster, of New Hampshire, was of Scotch-Irish descent; and Patrick Henry, of Virginia.

James J. Hill, the great American railway magnate was born in Canada, of Ulster parents. Alexander E. Orr, now head of the New York Life Insurance Company, was born in County Tyrone, and spent his first nineteen years there. Thomas Mellon, a leading financier of Pittsburg, was born in the same county. William H. Maxwell, superintendent of the public schools of New York city, is an Ulsterman. He has under him 16,000 teachers and more than half a million of pupils. That he has held with credit a position demanding superb executive ability for eight years is a telling tribute to the sterling qualities of the Scotch-Irish.

In brief, wherever push and energy, tenacity of purpose and similar qualities are demanded to assure success, the men of Scotch-Irish descent have always been to the fore in the United States.

IMPRESSIONS OF THE UNITED STATES BY A SCOTCH-IRISHMAN.

By E. J. Elliott.

(Abstract.)

Mr. Elliott began by referring in very complimentary terms to Mr. Knabenshue's paper. He then alluded to the fact that the people of the United States had many qualities in common with the Scotch-Irish. Their civilisation, for example, was largely indivividualistic, and as a people they had no love for collectivism. Both races were intensely practical, and their aims and aspirations, as a rule, excluded the visionary. Neither produced many great artists or poets, but they excelled in producing men of affairs. Many words and phrases found in such authors as Hawthorne, Emerson, Whitman, and Churchill were familiar to North Irish people, while not fully understood by English people. There was the same stern view of life to be found among the country people of New England and Ulster, no doubt owing to their Puritan ancestry It was largely a matter of heredity and atavistic tendency. There was, further, the same democratic view among both people—not the same reverence for ancient things that one found among the English as a rule. He also pointed out that in the "States" at present the men at the head of the large commercial and manufacturing concerns were mostly self-made men, or men of the first generation, and that in Ulster and Belfast this was largely the case also ; unlike England, where the captains of industry as a class were those who inherited their position from grandfathers or great-grandfathers. The result was that the manufacturers of the "States" and of Ulster corresponded to the men who founded the great industries in England in the early part of last century, and were therefore more devoted to business and more serious in application than the English manufacturers of the second and third generation, who very often were sportsmen first

and business men afterwards. The speaker then referred to the social condition of the workers in the "States," and subsequently to the characteristics of the employers. He also referred objectively to the striking features of the great cities, and showed how in some respects they were superior to ours, and in some respects inferior. The atmosphere of manufacturing towns in the eastern States was not so fuliginous as here, owing to the use of anthracite coal. Reference was made to Andrew Carnegie and Pittsburg; also to street traffic, sea-borne traffic, and railway traffic. In the speaker's opinion, they were behind us in the United States in railway travelling (except for freights, which were carried for about one-third of the English rates, to the great advantage of trade), also in the postal service and telegraph service. Their industries (with the exception of the boot and shoe industry and agriculture) were inferior to ours, and in his opinion could not be pursued successfully against ours if the protection tariffs were not in force. He stated that nobody wanted to practice handicrafts or the fine arts in the States. It was a land of labour-saving machinery, the great object being to turn out quantity with little consideration for quality. Department stores were referred to and described, and a good deal of information was given about technical education and agricultural conditions in the States. The Falls of Niagara were alluded to, and it was shown how the Niagara district was being changed, owing to the utilisation of the Falls as a force for producing electrical power for industrial purposes.

On the motion of Mr. F. R. Lepper, J.P., seconded by Dr. Clarke Robinson, a hearty vote of thanks was passed to the lecturers.

ANNUAL REPORT, 1906-7.

The Annual Meeting of the shareholders of the Society was held on 27th September, 1906, in the Museum, College Square North. Sir Otto Jaffé. J.P. (President), occupied the chair, and there were also present—Rev. Dr. Hamilton (President of Queen's College), Rev. A. D. Orr; Messrs. Robert Young, J.P.; Godfrey Ferguson, J.P.; John Horner, J. H. Davies, Joseph Wright, F.G.S.; W. Faren, W. T. Braithwaite, R. A. Kyle; William Gray, M.R.I.A.; Robert Patterson, M.R.I.A.; H. Riddell, H. C. Montgomery, Isaac Ward, and R. M. Young, J.P., M.R.I.A. (Hon. Secretary).

Mr. R. M. Young read the Annual Report, as follows :—

The Winter Session was opened in the Museum on 13th November, 1906, when an inaugural address was delivered by the President, Sir Otto Jaffé, J.P.—subject, "Weimar and its associations with Gœthe and Schiller," illustrated with a special series of lantern slides. The second meeting was held on 4th December, when an illustrated lecture was given by Mr. J. T. N. Anderson, M.Inst.C.E., on "Present Works and Progress in Australia and New Zealand."

The Third Meeting was held on 7th January, 1907, when Mr. James Taylor lectured on "Representative Modern Painters," illustrated with numerous lantern slides. The Fourth Meeting was held on 12th February, when Mr. Seaton F. Milligan, J.P., M.R.I.A., delivered a lecture—subject, "The Norsemen in Ireland," illustrated by lantern views and specimens of Viking ornaments found in Ireland. The fifth meeting was held on 12th March, when the following papers were read :—

(I.) "Some German Educational Methods and Ideals," by Prof. J. A. Lindsay, M.A., M.D.

(II.) "Alexander Mitchell, a famous Belfast Engineer," by Mr. F. J. Bigger, M.R.I.A.

The Sixth Meeting was held on 25th March, when a popular scientific lecture was kindly given by the Rev. Dr. Dallinger, F.R.S., subjects, "Wasps," illustrated by original limelight transparencies. The chairman was the President of Queen's College, and the Ulster Hall was filled with a large and appreciative audience.

The concluding meeting took place on the 16th April, when the following papers were read :—

(I.) The Scotch-Irish in America," by the Hon. S. S. Knabenshue (American Consul).

(II.) "Impressions of the States, by a Scotch-Irishman," by Mr. E. T. Elliott."

At all these meetings there was a gratifying attendance of the members and the general public

The various societies who make the Museum their headquarters show no diminution. The Museum was thrown open, as customary, to the public on Easter Monday and Tuesday at a nominal charge, and the attendance showed a substantial increase on last year. Amongst the donations received may be noted the large State umbrellas, taken from King Prempah's palace at Coomassie, presented by the officers of the West York Regiment, and the publications of the Smithsonian Institute, Washington. The customary exchange of valuable publications issued by the various learned societies continues, and are available to all members. Your Council, on the invitation of the authorities of the Irish International Exhibition. Dublin, have lent a number of the best objects in their Museum, including the stone coronation chair of the O'Neills, the harps of Hempson and C. O'Neill, the original copy of the Solemn League and Covenant, signed at Holywood, the uniform of H. J. M'Cracken, &c. They are all well displayed and duly catalogued in the Exhibition, where they have attracted much attention. Our Curator (Mr. Samuel Alexander Stewart, F.B.S.Edin., A.L.S.) placed his resignation in the hands of the Council on 1st May, 1907. It was received with much expression of regret at the loss to the Council and Society of such a faithful and valuable servant, whose scientific

knowledge, more especially as a well-known Irish botanist, was always freely placed at the disposal of the Society and its friends. He was appointed assistant to the late Mr. William Darragh in 1880, and succeeded him as curator in 1891. For a considerable time it has been felt that the valuable collections of the Society were not made use of as they might be by the citizens of Belfast, and the propriety of offering the contents of the Museum to the City Corporation has been often under discussion. Your Council took the subject again into consideration last autumn, and, after much deliberation, formulated a resolution empowering the transference of the Society's collections on loan to the City Corporation. This resolution was presented to a special meeting of the members, numbering thirty, held on 22nd February, 1907, and, on the proposal of the President, seconded by the Rev. Thomas Hamilton, was passed with one dissentient. On the 8th March a deputation of the Society, including the President, Rev. Dr. Hamilton, Professor Symington, William Swanston, Robert Patterson, and the Hon Secretary, attended the meeting of the Library and Technical Instruction Committee, presided over by Alderman Sir James Henderson, D.L., and offered the collections to the Corporation on the terms of the Society's resolution, and negotiations are still pending. Your Council noted with much gratification that your President recently received the signal honour from the Royal University of the honorary degree LL.D."

Mr. John Horner presented the financial statement, which was of a satisfactory character.

The President, in moving the adoption of the report, said that the balance-sheet showed that the society was quite solvent. The most important matter that had come before the Council during the past year was the proposal to transfer their valuable collections to the custody of the municipal authority. Such collections, through the evolution of municipal government, should more properly be in the care of municipal authorities than of private societies. In the hands of the Corporation the collections would probably be made more use of by the young people

attending their schools. He hoped that by this time next year the City Council would have adopted their suggestions, and taken over the collections for the benefit of the public at large. They proposed that the collections should remain in the Museum until the Corporation had provided a home for them, and he believed that in the old Town Hall they had a building which was eminently well suited for this purpose. He thanked the Council for incorporating in the report the paragraph referring to the honour which was to be conferred upon him by the Royal University.

The President of Queen's College, in seconding the motion, said the report seemed to him to be one of the most interesting and important which had ever been presented at an annual meeting. They learned from it something of the large amount of useful work done during the winter months. They had had quite a number of meetings, some of which had more than ordinary interest for them. The remarkable lecture delivered by Dr. Dallinger, for instance, would not soon be forgotten by those who had the privilege of hearing it. It was an honour to the Society to have had such a lecturer associated with it, and he had no doubt that, as a result of Dr. Dallinger's visit, a great deal of valuable information was diffused in reference to those too little known and often misunderstood insects—wasps—of which he treated. A great deal of the success of the Society during the session undoubtedly arose from the fact that they had such an energetic and self-sacrificing president. It was very lucky for them that Sir Otto Jaffé had occupied the chair during the year while they had been carrying on the negotiations with the Corporation for the transfer of their collections. There was little new to be said in regard to this transfer. The subject had already been pretty well thrashed out, and for his part he had not altered his opinion that it would be advantageous both to the city and to the Society that their collections should be transferred to the custody of the municipal authority. Alluding to the degree of LL.D., *honoris causa*, which the Royal University was about to confer upon Sir Otto Jaffé, he said he was sure they were all

agreed in thinking that never had such an honour been better deserved. This was not only their opinion but that of the people of Belfast generally. The report very justly referred to the retirement of Mr. Stewart and to the eminent services which he had rendered to his country as a botanist. Every member of the Society would regret his retirement, but Mr. Stewart could rest assured that he carried with him the best wishes of all of them. He did not think it would be right if some one did not also make reference to the excellent work which had for so long been accomplished by their esteemed honorary secretary. Had it not been for Mr. R. M. Young the Society would not have succeeded in the way it had done, and he hoped the time would soon come when they would recognise his services in some worthy and tangible manner.

Mr. Gray suggested that the words "with one dissentient" should be omitted from the paragraph referring to the passing of the resolution offering the collection to the care of the municipal authorities. The words he referred to were misleading, and quite unnecessary. As the resolution was not passed unanimously, it would be sufficient to report that it was "passed." The number for or against should not be quoted, unless a poll were taken, particularly in a case like this, when only a portion of those present voted, and some of us who voted for the overture did not agree as to the conditions attached.

The motion was carried.

Mr. Gray proposed the re-election of the following five members of the Council : — Professor Gregg Wilson, Professor W. B. Morton ; Messrs. J. H. Davies, John Horner, and Robert Young.

Mr. Gray said that the proposed transfer of the Museum collection to the municipal authorities will involve the consideration of serious questions as to the future of the Society, and he hoped the Committee will be able to make the transfer in accordance with the wishes of the present shareholders, and the traditions of the past.

Mr. Braithwaite seconded the motion, which was passed.

A VALUABLE GIFT.

Mr. Davies proposed—"That the most cordial thanks of this meeting be tendered to Mr. S. A. Stewart, F.B.S.E., A.L.S., for the donation of his exceedingly valuable herbarium and palæontological collections, formed during the many years of his long and active life, that have been devoted to botanical and geological researches in this country." He said it seemed right that some expression should be made of the Society's sense of deep indebtedness for the services Mr. Stewart had rendered. To have had one of his wide general knowledge and scientific attainments in the position he occupied had been a positive honour to the Society. Not only was he an eminent botanist, as they all knew, but he was possessed of a close acquaintance with almost every branch of natural science, being indeed the very type of a true field naturalist. To all beginners in natural history studies who had sought help from his wide experience it had ever been ungrudgingly given. Mr. Stewart remained an honorary member of the Society. In recognition of his botanic work he was long ago elected a fellow of the Botanical Society of Edinburgh. More recently, on the same grounds, he was unanimously chosen an associate of the Linnæan Society, a distinguished honour valued by him all the more since it was entirely unsought and unexpected. His scientific publications, and in particular, the admirable "Flora of the North-East of Ireland," would continue to be consulted by those interested in the natural productions of various parts of this country. In bringing his official connection to a close Mr. Stewart continued to evince the same interest in its aims that he had ever done and in the very spirit of generosity had handed over to it, to be held in the Museum, the greater part of his collections—collections of the highest value, both botanical and geological. Concerning these a letter was lately received from him, in which the motives by which he had been actuated in making this gift to the Society were so clearly explained in his own characteristic manner that no apology need be made for reading it in its entirety. The letter was as follows:—"Dear Mr. Davies,—Advancing years compel me to

cease my botanical and geological work in the field, and I have been considering as to the best means of disposing of my accumulated specimens, that they may be helpful to others who follow, and carry on the local natural history studies. As the best means of preserving these specimens and making them available for future reference, I desire them to be kept in the Belfast Museum, and I wish, through you, to present my flowering plants and fossils to the Belfast Natural History and Philosophical Society as the proper custodians of what relates to the natural history of the North of Ireland. With regard to the botanical collections, I may say the specimens represent the flora of the British Isles, not completely, but the exceptions are not, however, very numerous. The Irish specimes have mainly been collected by myself; those of England and Scotland have mostly been received from correspondents. The plants are not mounted in herbarium fashion, but in loose sheets, furnished with localities and dates of collection. As to the geological specimens, they are not so well authenticated, but are mainly local. Those in the green sand and the hard white chalk may be taken to be from the local cretaceous rocks, but exact localities are often absent. Knowing your interest in natural science and your success as a botanical expert, I would ask you kindly to be the medium through which this transfer is made.—S. A. Stewart. P.S.—I may mention further that it is my intention later on to present your library with my "Journal of Botany" (nearly 40 volumes) and some other of my scientific books.—S. A. S."

Mr. Robert Young said it was with very mixed feelings that he desired to second the resolution. He endorsed all that had been said by Mr. Davies. Mr. Stewart was so modest that, with the exception of botany, they scarcely ever heard him mention any scientific subject, but those who knew him best were aware that he was also an excellent geologist, and had a very fair knowledge of archæology. On the whole, Mr. Stewart was a very exceptional man, and their hope was that he might be spared for many years to enjoy his well-earned leisure.

Mr. Joseph Wright, in supporting, said Mr. Stewart was one of the founders of the Naturalists' Field Club. For forty years he was a member of the Committee of that Club, and published in its transactions several very important papers. Combined with a high scientific reputation, Mr. Stewart was universally respected and esteemed.

Mr. William Gray endorsed all that had been said with reference to Mr. Stewart in the resolution proposed by Mr. Davies and in the Report. Mr. Gray said he had never known a more faithful official connected with any Society; Mr. Stewart had done good work as a Naturalist, both by his practical researches in the field and his valuable contributions to the scientific literature of the day; the results of his efforts to extend our knowledge of Irish Botany are a credit to himself, the Natural History Society, and to Belfast.

Mr. Robert Patterson and the President supported the resolution, which was unanimously passed.

On the motion of Mr. Ferguson, seconded by Mr. Kyle, a vote of thanks was accorded Sir Otto Jaffe for presiding, and

The proceedings terminated.

At a subsequent meeting of the Council Sir Otto Jaffe was again chosen president, and the other office-bearers were re-elected.

EDUCATIONAL ENDOWMENTS (IRELAND) ACT, 1885, 48 & 49 Vict., ch. 78.

The Account of the Council of the Belfast Natural History and Philosophical Society for the Year ended 30th April, 1907.

Dr. **Cr.**

CHARGE.

,, Subscriptions		104 3 0
,, Dividends		17 2 0
,, Rents		29 19 6
,, Fees		0 7 0
,, Miscellaneous Receipts, viz.—		
Proceeds Dr Dallinger's Lecture	£58 4 11	
Admissions to Museum, May 1st to April 30th	17 16 9	
,, Easter	15 13 3	
Portion of Lecture Fees	9 0 0	
Error in Cheque ...	0 0 5	
		100 15 4
,, Balance due Treasurer		26 6 2
Total ...		£278 13 0

DISCHARGE.

By Amount of Payments under the following headings:—		
Maintenance of Premises, &c....	£15 5 8	
Rent and Taxes, &c.	35 11 1	
Salaries ...	93 17 6	
		144 14 3
,, Other Payments, viz:—		
Printing, Stationery, &c.	33 15 5	
Advertising	11 19 10	
Postage and Carriage	4 13 3	
Fuel and Gas	11 16 2	
Auditor ...	1 1 0	
Hardware	0 3 2	
Insurance	6 12 0	
Lanterns ...	8 1 0	
Framing Picture	0 7 0	
Ticket Collectors	0 17 6	
Lecture Fees	20 0 0	
Attendants, &c.	6 17 2	
Miscellaneous	1 6 10	
		107 10 4
Total Payment		252 4 7
,, Balance		26 8 5
Total ...		£278 13 0

N.B.—Besides the above Balance there is a Sum of £400 standing to the credit of this Account in the York Street Flax Spinning Co., Ltd., 4½ cent. per Debenture Stock.

We certify that the above is a true Account.

ROBERT M. YOUNG, Governor,
JOHN HORNER, Accounting Officer.

Dated this 30th day of May, 1907.

I certify that the foregoing Account is correct.

R. J. BAKER, Auditor

Dated this 30th day of August, 1207.

DONATIONS TO THE MUSEUM, 1906-07.

From Mrs. Battersby, Rathowen, Westmeath.

Three specimens of saw fly *(sirex gigas)*.

From Egypt Exploration Fund.

Head, from Deir El-Bahari, 1903-06, XI. Dyn.
Figure of Patenen, from Deir El-Bahari, 1903-06, XVIII. Dyn.
Also eight pieces of glazed ware.

From Mrs. Johnston, London.

Specimens of rocks and minerals from County Donegal.

From Mr. John Ward, J.P., F.S.A.

Flint arrowheads, knives, charm flints, also steel and strike-lights, made in Sussex. They are exported to West Africa, where they are used by the natives.

Ushabtieh figures of XIX.-XXIII. Dyn, which were buried with mummies in order to work for them in the kingdom of Osiris.

Found at the Rameseum and Abydos.

From the Colonel and Officers, West York Regiment.

Three large State umbrellas, taken from the Palace of King Prempah of Ashanti and Coomassie, 1896.

From Mr. S. A. Stewart, A.L.S., F.B.S.E.

A botanical collection comprising dried specimens of nearly all the flowering plants native in Great Britain and Ireland; also a large collection of local fossils, mainly Cretaceous and Liassic.

ADDITIONS TO THE LIBRARY, 1906 TILL 1907.

ADELAIDE.—Transactions of the Royal Society of South Australia. Vol. 30, 1906. *From the Society.*

ALBANY.—Fifty-sixth Annual Report of New York State Museum. Vol. 1, 1904. *University of the State of New York.*

AUSTEN.—Transactions of the Texas Academy of Science. Vol. 7, 1905. *The Academy.*

BASEL.—Verhandlungen der Naturforschenden Gesellschaft in Basel. Vol. 18. part 3, 1906. *The Society.*

BELFAST.—Report and Proceedings of Belfast Naturalists' Field Club. Series 2, Vol. 5, part 4, 1905, and part 5, 1906. *The Club.*

BERGEN.—Bergens Museums Aarbog, parts 1—3, 1906, and Aarsberetning for 1906; Meeresfauna, parts 2 and 3, 1906; also Crustacea of Norway, Vol. 5, parts 15 and 16, 1906. *The Director.*

BIRMINGHAM.—Records of Meteorological Observations for 1906. *Birmingham Institute.*

BOLOGNA.—Rendiconto della R. Accademia dell' Instituto di Bologna. New series, Vol. 9, 1905. *The Institute.*

BOSTON.—Proceedings of the Boston Society of Natural History. Vol. 32, Nos. 3—12, 1905, and Vol. 33, Nos. 1 and 2, 1906; also Occasional Papers, Vol. 7, Nos. 4—7, 1905-6. *The Society.*

BOULDER.—University of Colorado College Studies. Vol. 3, Nos. 3 and 4, 1906, and Vol. 4, Nos. 1 and 2, 1906-7. *The University.*

BREMEN.—Abhandlungen vom Naturwissenschaftlichen Verein zu Bremen. Vol. 18, part 2, 1906. *The Society.*

BRESLAU.—Zeitschrift für Entomologie vom Verein für Schlessiche Insektenkunde. 1906. *The Society.*

BRIGHTON.—Report of Brighton Public Library, Museum, and Art Galleries, 1904. *The Committee.*

BROOKLYN.—Science Bulletin of Brooklyn Institute of Arts and Sciences. Vol. 1, Nos. 4, 8, and 9, 1904—6. Also Cold Springs Harbour Monographs, No. 6, 1906. *The Institute.*

BRUSSELS.—Bulletin de la Société Royale de Botanique. Vol, 41, part 3, 1903, vol. 42, part 3, 1906. *The Society.*

,, Annales de la Société Royale Zoologique et Malacologique de Belgique. Vol. 40, 1905. *The Society.*

,, Annales de la Société Entomologique de Belgique. Vol. 50, 1906. *The Society.*

BUFFALO.—Bulletin of Buffalo Society of Natural Sciences. Vol. 8, No. 4, 1906. *The Society.*

CALCUTTA.—Records of the Geological Survey of India. Vol. 33, parts 2—4, 1906, and Vol. 34, parts 1—4, 1906. *The Director.*

,, Memoirs of the Department of Agriculture in India. Botanical series. Vol. 1, Nos. 1—4, 1906. Entomological series. Vol. 1, No. 1, 1906. Also the Agricultural Journal of India. Vol. 1, parts 1—4, 1906, and vol. 2, part 1, 1907. *The Department.*

CAMBRIDGE.—Proceedings of Cambridge Philosophical Society. Vol. 13, parts 5 and 6, 1906, and Vol. 14, part 1 1906. *The Society.*

CAMBRIDGE, MASS.—Bulletin of the Museum of Comparative Zoology. Vol. 43, Nos. 4 and 5, 1906, vol. 46, No. 14, 1906, vol. 48, No. 3, 1906, vol. 49, 1906, and vol. 50, Nos. 1—8, 1906. Also Curator's Report for 1906. *The Keeper of the Museum.*

CARDIFF.—Report of the Welsh Museum of Natural History, Arts, and Antiquities, 1905 and 1906.
The Curator.

CASSEL.—Abhandlungen des Vereins für Naturkunde zu Kassel, 1906. *The Society.*

CHICAGO—Field Columbian Museum Publications, Nos. 106 and 107, 1906, and 109—114, 1906. *The Museum.*

CHRISTIANIA.—Forhandlinger i Videnskabs-Selskabet i Christiania, for 1905.
The Royal Norske Frederiks University.

CINCINNATI.—Lloyd's Mycological Notes, Nos. 19 and 20, 1905, and 21—25, 1906. *The Messrs. Lloyd.*

COLCHESTER.—Reports of Colchester Corporation Museum for 1905 and 1906. *The Committee.*

COLORADO SPRINGS.—Colorado College Studies. Vol. 3, No. 2, 1906. Also Science Series, Nos. 47—49, and Engineering Series. Vol. 1, Nos. 1 and 2.
Colorado College Scientific Society.

COLUMBUS.—Bulletin of Ohio State University. Vol. 10, Nos. 1 and 3, 1905, and Supplement, 1906.
The University.

DANTZIC.—Schriften der Naturforschenden Gelleschaft in Danzig. 1906 *The Society.*

DAVENPORT. — Proceedings of the Davenport Academy of Sciences. Vol. 11, 1906. *The Academy.*

DUBLIN.—Scientific Transactions of Royal Dublin Society. Series 2, vol. 9, 1906. Scientific Proceedings, New Series, vol. 11, Nos. 8—12, 1906, and Economic Proceedings. Vol. 1, part 8, 1906.
The Society.

EDINBURGH.—Transactions of the Botanical Society of Edinburgh. Vol. 23, part 2, 1906. *The Society.*

" Proceedings of the Royal Society of Edinburgh, Vol. 26, Nos. 1—6, 1905-6. *The Society.*

EDINBURGH.—Proceedings of the Royal Physical Society. Vol. 16, Nos. 6 and 7, 1905-6, and Vol. 17, No. 2, 1906-7. *The Society.*

ELBERFELD.—Jahresbericht des Naturwissenschaftlichen Vereins in Elberfeld, No. 11, 1906. *The Society.*

GENOA.—Rivista Ligure di Scienze, Letture, ed Arti, Anno 28, fasc. 2-6, 1906, and Anno 29, fasc. 1, 1907. *Societa Lettere e Conversazione Scientifiche.*

GIESSEN.—Bericht der Oberhessischen Gesellschaft für Natur und Heilkunde zu Giessen. *The Society.*

GLASGOW.—Proceedings of the Royal Philosophical Society, vol. 57, 1906. *The Society.*

GORLITZ.—Abhandlungen der Naturforschenden Gesellschaft zu Gorlitz. Vol. 25, part 1, 1906. *The Society.*

GOTHENBERG.—Gotebergs Kungl Vetenskaps och Vitterhets Samhalles Handlingar, parts 7 and 8, 1898, and part 9, 1906. *The Society.*

HAMBURG.—Verhandlungen des Naturwissenschaftlichen Vereins in Hamburg. Vol. 13, part 3, 1906. *The Society.*

IGLO.—Jahrbuch des Ungarischen—Karpathen Vereins, 33rd year, 1906. *The Society.*

INDIANAPOLIS.—Proceedings of the Indiana Academy of Sciences, 1905. *The Academy.*

KIEW.—Memoirs of the Society of Naturalists of Kieff. Vol. 20, part 2, 1906. *The Society.*

LAUSANNE.—Bulletin de la Société Vaudoise des Sciences Naturelles. Vol. 42, Nos. 155 and 156, 1906. *The Society.*

LAWRENCE.—Science Bulletin of the University of Kansas. Vol. 3, Nos, 1-10, 1905-6. Annual Bulletin of the Mineral Resources of Kansas for 1902 and 1903. Also special Report on Lead and Zinc. Vol, 8. 1906. *The University.*

LEIPSIC—Mitteilungen des Vereins für Erdkunde zu Leipzig, 1905. Also Library Catalogue, 1903.
The Society.

LEIPSIC.—Sitzungberichte des Naturforschenden Geselleschaft zu Leipzig, 1905. *The Society.*

LIMA.—Boletin del Cuerpo de Ingenieros de Minas del Peru. Nos. 29 46, 1905-6 : also Segunda Memoria que Presenta el Director, 1904-5. *The Director.*

LONDON.—Report of the 75th Meeting of the British Association. South Africa, 1905: also Report of the Corresponding Societies Committee, and of the Conference of Delegates, 1905. *The Association.*

,, Quarterly Journal of the Geological Society of London. Vol. 62, parts 2-4, 1906, and Vol. 63, part 1, 1907. *The Society.*

,, Journal of the Royal Microscopical Society, Nos. 172-175, 1906, and Nos. 176 and 177, 1907.
The Society.

,, Transactions of the Zoological Society of London. Vol. 17, part 6, 1906. Also Proceedings for 1906, and List of Fellows. *The Society.*

MADISON.—Bulletin and Maps of the Geological and Natural History Survey of Wisconsin. No. 14, 1906.
The Commissioners.

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Report and Proceedings

OF THE

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Natural History and Philosophical Society

FOR THE

SESSION 1907-1908.

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A General Meeting of Shareholders in the Museum is held annually in May or June, or as soon thereafter as convenient, to receive the Report of the Council and the Statement of Accounts for the preceding year, to elect members of Council, to replace those retiring by rotation or from other reasons, and to transact any other business incidental to an annual meeting. Shareholders only are eligible for election on the Council.

The Council elect, from among their own number, a President and other officers of the Society.

Each Member has the right of personal attendance at the ordinary lectures of the Society, and has the privilege of introducing two friends for admission to such; and he has also the right of access to the Museum and Library for himself and family residing under his roof, with the privilege of granting admission orders for inspecting the collections in the Museum to any person not residing in Belfast or within five miles thereof. The session for lectures extends from November to May.

The Museum, College Square North, is open daily for the admission of visitors, for such hours as the Council may from time to time decide; the charge for admission to non-members is sixpence each. The Curator is in constant attendance, and will take charge of any donation kindly presented to the Museum or Library.

Any further information required may be obtained from the Honorary Secretary.

BELFAST

NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

SESSION 1907-8.

12th November. 1907.

Sir Otto Jaffe, LL.D., President, in the Chair.

"CANADA IN THE TWENTIETH CENTURY."

By Mr. J. R. Fisher., B.L.

(Abstract.)

At the outset of the proceedings, Mr. John Horner said he wished to say a few words with reference to their President. At the meeting of their Council, and subsequently at the annual meeting of their Society, congratulations were extended to Sir Otto Jaffe upon the hon. degree of LL.D. which had been recently conferred upon him by the Royal University. As a Society, they felt that honour was reflected upon them. The only regret they felt in the matter was that, unlike a previous honour conferred upon Sir Otto, Lady Jaffe did not participate in the present one. The honour was well deserved. Sir Otto had shown the greatest interest in educational matters, especially scientific education, and he thought those present would be glad to have that opportunity of extending their congratulations. He moved a resolution accordingly.

Professor Symington, in seconding, said they took the compliment conferred upon Sir Otto as a compliment to that

Society. He was sure they all joined in congratulating Sir Otto upon the well-deserved honour.

The resolution was passed by acclamation.

Sir Otto Jaffe said he felt deeply their kind observations and congratulations, and words failed him to express his thanks as he should like. He considered the honour a very high one, and was exceedingly obliged to the gentlemen who were instru mental in securing it for him. He was gratified to think that he had the esteem of his fellow-citizens. Might he say that they heartily congratulated Mr. Robert Young, who had been made a Privy Councillor? They were sorry he was not present that night, but his son was with them. Mr. Young was an old member of that Society, and he was one of the most respected citizens of Belfast. He was sure his Majesty the King could not have selected a more worthy citizen upon whom to confer such a high honour, They trusted he might live long to enjoy the distinction.

The President then called upon Mr. Fisher to deliver his lecture.

Mr. Fisher, who was cordially received, said he would not attempt to cover such a mighty scope as entire Canada, but with the assistance of the limelight views he hoped to give some idea of what was going on in that country, and deal with its industrial and agricultural development, which were at present equalled by no other country in the world. To give some idea of the size of Canada, it was not much smaller than Europe, and twice the size of India. Canada contained seven provinces, or groups of provinces, each with the possibilities of a mighty empire, and the maritime provinces had a great future. The lecturer proceeded to refer to Quebec, where the people, he said, were highly industrious and law-abiding, and, above all, loyal to the Empire; and next dealt with the historical development of the country. Though it might be against our national pride, Canada was not originally a British possession. In the fifteenth and sixteenth centuries the Spaniards easily took the lead in the matter of colonisation, and

then the French were ahead of the British. However, the turning-point in the history of the country, so far as England was concerned, came with Wolfe, and from then the story of the country as a British possession began. Halifax and Quebec were dealt with by Mr. Fisher, after which he alluded to Winnipeg, the Western capital of the country, remarking in passing that Mr. O. Smith would give every assistance to those going West. He had been sometimes asked as to who should go to Canada, and his opinion was that no one could possibly recommend the country as a place where everyone could succeed; it was essentially not a country for idle people. The next aspect of the country dealt with by the lecturer was the Western or wheat-growing area, and in this part of the Dominion he emphasized that the settler had no difficulty in clearing the land, but had merely to open up the virgin prairie. The crop of wheat was not, however, treated like that in this country, as after the threshing the straw was burnt. The next places dealt with were Alberta and Calgary, the lantern views giving an admirable representation of the Rockies in the distance, Here it was formerly considered hopeless to keep cattle, but at the present time there was a herd of about nearly forty thousand cattle in Alberta. Proceeding, the lecturer gave his hearers a graphic description of the rugged grandeur of the Rocky Mountains, striking a pathetic note with a reference to the last herd of buffaloes. The fruit-growing country on the Pacific slope was alluded to, as was Fraser River, which separates Columbia and Vancouver from the United States. British Columbia was one of the most hopeful parts of Canada if the Government had only the wisdom to preserve the forests. In conclusion, Mr. Fisher reiterated what he had said as to Canada being the place for hard work, but for the man who took a job with the intention of seeing it through he could promise success, and he could not better conclude than by quoting—

The Sphinx that watches by the Nile
  Has seen great empires pass away;
The mightiest lasted but a while,

Yet ours shall not decay.
Because, although red blood may flow.
And ocean shake with shot,
Not England's sword but England's word
Undoes the Gordian knot.
Bold tongue, stout heart, strong hand, brave brow,
The world's four quarters win,
And patiently with axe and plough
We bring the deserts in.

On the motion of Mr. Garrett Nagle, R.M., seconded by Professor Symington, F.R.S., a hearty vote of thanks was passed to the lecturer.

12th December, 1907.

Sir Otto Jaffe, LL.D., in the Chair.

"DEVELOPMENT OF CELTIC ART.
By Mr. R. A. Dawson.

(*Abstract*).

Mr. Dawson, in the course of an interesting lecture, said the "finds" made from time to time and classified in our various museums taught them to know all the movements of early man, and to know how the various races spread themselves over the earth. Of the earliest races they had no remains of habitations. The first inhabitants probably lived in caves or in huts or tents made from the branches of trees placed together. Their earliest tools were of rough chipped stone, at first used in the hands, and afterwards lashed by twigs and grasses to the handles, broken from the branches of trees. The race to which the early people belonged were called the Iberian race, and some authorities had derived the name Ireland from that name. By Celtic art they meant the art of the people who spoke the Celtic language. These people belonged to the Aryan group of nations, and came from the same cradle of the race, in Central Asia, as did the ancestors of the Greeks, Italians, Teutons, Slavs, Armenians, and Persians. They appeared to have entered Europe and passed up the Valley of the Danube into North Italy and Switzerland, where they formed important settlements. Many classical writers mentioned the Celtic people, and all were agreed as to their characteristics. Looking back to the Celts on their way to Ireland, two important centres had been discovered, the earlier one at Halsstadt, near Salzburg, in Austria, discovered in 1846, and the latter

one at Le Tene, at the head of Lake Neuchehatel, in Switzerland. The Goidels arrived in Ireland in the bronze age stage of civilisation, which followed the advance of other contemporary races, and had become proficient in the use of bronze. The Celts borrowed freely from other nations their units of decoration, but they had the faculty of so modifying whatever they borrowed as ultimately to give it a character of their own. Summing up the decorative features of pagan Celtic art in the bronze age, which were transmitted to the pagan and Christian art of the early iron age, they had the closely coiled spiral or voluted spiral, the use of rows of dots, the use of diagonal lines in preference to horizontal and vertical ones, and the use of designs founded on the curved Swastika. Of all these the spiral was the most important. The two outstanding features of the art of the late Celtic period were, to his mind, the long flowing curves and the further development of spiral ornament into definite ornaments based on the Swastika and Triskele spirals. The Swastika and Triskele developments, although found in Scotland and England, were more characteristically Irish. It was the Irish artists who took these forms and worked them up to the highest degree of perfection, and they remained the masters of this class of ornament up to the eleventh or twelfth century in the Christian period. The metal workers of the late Celtic period were not only capable of executing some of the finest pieces of repousse bronze that the world has ever seen, but they also excelled in producing works of art in wrought iron of great merit. Specimens of decoration on wood had been found, and it might interest some of them to know that poker-work was used as a means of decoration. To sum up, the characteristics of the late Celtic or early iron age designs were—(1) the flamboyant curves, probably suggested by foreign foliated ornament, but reduced more or less to geometrical lines; (2) spiral forms based on the Triskele and Swastika; (3) curved geometrical forms; (4) straight-lined geometrical forms; (5) enamels were used; and (6) the different kinds of shading engraved on metal, wood, bone, and pottery. The leading characteristics of the Celtic Christian

art were—(1) the prominence given to the margin or frame within which the whole design was enclosed ; (2) the arrangement of the design within the margin in panels, each containing a complete piece of ornament ; (3) the use of setting out lines for the ornament placed diagonally with regard to the margin ; (4) the use of interlaced work, step patterns, key patterns, spirals, and geomorphs in combination ; (5) the geometrical perfection of all ornament ; and (6) the superiority of the decorative designs to the figure-drawings. All these characteristics could be seen in the manuscripts of the best period, and in the ninth, tenth, and eleventh centuries they were followed in the stone work.

On the motion of MR. F. J. BIGGER, seconded by MR. W. J. FENNELL, a hearty vote of thanks was accorded to Mr. Dawson for his lecture.

14th January, 1908.

SIR OTTO JAFFE, LL.D., President, in the Chair.

"PRIMITIVE AUSTRALIA."

BY PROFESSOR GREGG WILSON.

(*Abstract.*)

The CHAIRMAN said since they had last met the world had lost one of its greatest men, who was born in Belfast. He referred to Lord Kelvin. They had doubtless seen it stated in the Press that a permanent memorial should be erected to the memory of the deceased. Next to Newton there perhaps was never a scientist of such wide range of knowledge as Lord Kelvin. He (Sir Otto) had taken it upon himself, as their President, to take the first step in forming a small committee to crystalize the idea of erecting a statue or some other permanent memorial to his memory. The Lord Mayor (the Earl of Shaftesbury) had kindly consented to call a public meeting for the 21st inst., and he sincerely hoped that all present and other members of the Society would attend on that occasion. The matter had passed away from that Society to the larger society of citizens, and he trusted they would all give their support. A vote of condolence would be passed on the 21st inst. with Lady Kelvin and the other members of the family, but, notwithstanding that, he would ask them to pass a vote of condolence that evening in silence.

The audience then rose to their feet.

The CHAIRMAN briefly introduced the lecturer.

Professor GREGG WILSON, who was cordially received, said

that Australia was a great continent, extending to about three million square miles, so that it was more than three-fourths the size of Europe. It was remarkable for the varied conditions found in it; the north was tropical, the centre was desert, and at certain seasons was intensely hot, while at others the nights were extremely cold; while the south was very variable. Naturally the plants and animals differed in these regions, as did also the habits of the black fellows. The plants of Australia were of great interest. Many of the types were similar to those that existed in Europe in tertiary times, and it seemed probable that in Australia there were survivors of a formerly widespread flora, But while old types had been preserved they had not remained unchanged, but had become adapted to the varied conditions that prevailed in Australia. The result was that there was an enormous number of peculiar species that were found nowhere else in the world. Another notable feature of Australian vegetation was its uniformity over great areas; the dense mallee scrub occurred in patches of hundreds, and even thousands, of square miles, and heath, spinifex, and the gum tree were all curiously dominant over vast areas. The animals of Australia were markedly primitive. Australia appeared to have been cut off from the continent of Asia since mesozoic times, with the result that the fiercer and more intelligent groups of mammals had never got a footing in it. The old-fashioned marsupials which abounded throughout the world in mesozoic times were still dominant, but they showed specialization of many kinds; some were herbivorous, others carnivorous, some burrowed, while others climbed trees. The animals that attracted him most were Ceratodus, the lung-fish, and Platypus, which, though a mammal, laid eggs. Ceratodus was known as a fossil long before it was discovered in the Mary and Burnett Rivers in Queensland. It and its near relatives flourished in early mesozoic times; but the group Dipnoi had all but disappeared, and at present they had only some species in Australia, one in Africa, and one in South America. In many ways Ceratodus suggested amphibians, and it was possible that

the group might have been derived from some such form. Ceratodus lived in streams that became more or less stagnant during the hot season, and it was able to survive owing to its power to breathe by means of a lung. The lecturer then gave a most interesting account of the human beings. He said they were commonly regarded as the lowest of the low. They were in the stone age. The men were not, however, to be despised. There was a great deal of good about them, and a great deal of marvellous ability. Their mode of living, manners, and characteristics were in turn touched upon, and, continuing, Professor Wilson said the men did the hunting and fighting, while the women did the rest The women were really slaves, and were old at thirty. The husband had absolute authority over his wife, and could do almost anything he wished with her. The one thing recognised was the right of property. Concluding, the lecturer said the white man's drink was exterminating the black fellow.

On the motion of Mr. F. R. Lepper, J.P., seconded by Mr. William Gray, M.R.I.A. a hearty vote of thanks was passed to Professor Wilson.

12th February, 1908.

Mr. John Brown, F.R.S., in the Chair.

"THE SCIENTIFIC BASIS OF MUSIC."

By Professor W. B. Morton.

(*Abstract.*)

Professor Morton, who was warmly received described the subject as being on the borderland between science and art. Some of the questions which arose could be answered on purely physical principles, but in many cases historical and purely æsthetic considerations came in. He proposed to answer the question as to the structure of the diatonic scale—why the black notes on a piano occur in groups of two and of three. After an explanation of the physical facts underlying the production of sound, the question of pitch was discussed, and referred to the rate of vibration of the instrument producing the sound. For musical purposes it was necessary to fix on definite pitches among the range of audible notes. It was shown that the particular notes adopted in Western music arose from the practice of singing in parts. This led to the use of notes whose numbers of vibrations bore simple relations to one another, and hence to the construction of the diatonic scale. Experiments were shown to illustrate the relation of these laws of consonance to the physical phenomenon of "beats" occurring when two notes are sounded together which differ slightly in pitch, and, further, to the fact that notes produced by musical instruments are in general compound.

Professor Lindsay moved a vote of thanks to Professor Morton, which was seconded by Mr. Swanston, and passed by acclamation.

18th March, 1908.

Dr. S. W. Allworthy in the Chair.

"THE LESSONS OF HISTORY.

By Rev. J. Rosenzweig.

(Abstract.)

Rev. J Rosenzweig said the title of his lecture was "The Lessons of History." For the education of the young for the instruction of the mature, for the edification of the old he knew of no aid more powerful than history. Its broad pages were covered with the gifts of time and they were mighty among the mightiest of instructors. History was written in every land, in every age, in every tongue, and it had always the same lesson to teach. Like the Holy Bible, history owed its pre-eminence as a teacher to the fact that it was the concentrated essence of biography. It was the mentor to mankind, the practical and practising preacher of highest truth and greatest wisdom. Properly studied, it disclosed to man the themes that might give him the motive for the onward tendency. It was a sacred oratorio, in which the story of each nation formed a part and each person represented a musical note. In spite of the discords and bars that occasionally met them its inspiring melody had resounded down the centuries, so that to-day they might gather from its tones notes of warning and consolation ; and even to the remotest age it would go on reverberating through time, bearing a message of faith. However widely men might differ as to their view of history there could be no gainsaying the net results of the

universal history in so far as they make for progress or retrogression. The causes might be obscure, but the effects were theirs to ponder on that they might not only adorn a tale, but also point a moral for succeeding generations. Their view of history greatly depended upon their view of men. If they believed that men were so many chattels to be used by the lords of creation as vassals and slaves, then history became so many funeral sermons, unsupported by fact and insupportable by reason of fulsome flattery. If, on the other hand, they believed that men were creatures endowed with grand faculties—if they believed that all men, of every creed, colour, and condition, were children of the same God, born for equal justice and equal liberty—then history's page became illumined by a divine light, and the lessons of history became inspired and inspiring in the highest degree. The second was his view. He regarded man as an animal on one side of his nature. On the other side he differed from the animal by possessing that which the animal could not possess Man, then, might be regarded as an animal whose noblest function was the conception of high ideals, and whose life was to be devoted to the realisation of these ideals History was the record of the attempt of man to introduce into real life the highest ideals. It was the story of man's success or failure in this respect. To be fully understood, it must be studied from a mount of observation that afforded a complete view. Partial history could give but partial results. In the story of history's lessons they must not take to-day as an isolated fact, but as the result of the sum of all preceding days since man appeared on this planet. Viewed as a whole, history was the story of a growth, and were he asked to tell in a few words what that growth was he should say that it was a perpetual movement towards the ideal—a movement spiritual in character and embodying man's attributes of God.

"FORAMINIFERA.'

By Mr. Joseph Wright, F.G.S.

Mr. Wright read a very interesting paper on ' Foraminifera from the Gravel Pit, Longhurst, Dunmurry, and Other Localities in the vicinity of Belfast, with a Reference to the Malone Sands " He said :—In April, 1906, I received from Mr. John Brown, F.R.S., a ball of rolled clay from the gravel pit at Longhurst, Dunmurry, similar balls frequently being met with at this place. This ball, which weighed seven and a half pounds, yielded a large quantity of foraminifera, about 1,500 specimens. The clay of which it was composed must have been in a soft state when rolled in the gravel, as the outer surface contained the gravel more or less deeply imbedded in it. Three other balls were examined later, and they also contained specimens in abundance. The gravel pit consisted of stratified sands and gravels, at the bottom of which was a deep bed of clay; this clay contained foraminifera in the same profusion as the balls of clay already referred to, and which were probably derived from this or some similar source. Foraminifera were also found in situ in the finer sands, but in much smaller numbers. In company with my friend Mr. Robert Bell, I subsequently visited the gravel pits at Armagh, Lisburn, and Dundonald, the finer sands at these places all yielding foraminifera. At Dundonald they occurred in great profusion in a bed of clay, at the bottom of the pit, about 1,000 specimens being taken from a sample of one-and-a-half pound weight. Having been informed by Mr. George Gough, F.G.S., that he had found foraminifera in the Malone sands at Stranmillis, I visited the place myself and brought away a large quantity of the sand for examination; this yielded forty-five foraminifera—a very small number, considering the quantity of material examined. This is probably largely due to rain-water percolating freely through the sand, and thus gradually destroying these delicate organisms. As some of the fine sands in the gravel pits already referred to closely resemble these Malone sands, and as they all contain foraminifera, I think it probable that both these, as well as well as the eskers, represent a great series of gravels, sands, and clays, which have been deposited off our coast when the land lay at a lower level, the eskers being tilted up by currents running in opposite directions, and to the same cause we may attribute the formation of sand-banks now lying off our coasts, as the Nymph Bank, off Dublin, the Bray Bank, the Arklow Bank, and others.

Table showing the distribution of the Foraminifera in the gravel pits in the vicinity of Belfast, Lisburn and Armagh, and also in the Malone Sands of Stranmillis, Belfast.

Abbreviations—vr, very rare ; r, rare ; f, frequent ; c, common ; vc, very common.

	Rolled balls of Clay	In Situ.				
LIST OF SPECIES.	Longhurst, Belfast.	Longhurst, Belfast.	Dundonald, Belfast.	Lisburn.	Armagh.	Stranmillis, Belfast. Malone Sands.
Miliolina seminulum (Linné) .	f	vr	vr	...	..	..
M. subrotunda (Montag.) ..	r	vr	.	...	...	..
Textularia globulosa, Ehr. ..	vr	vr	...	...	...	...
Verneuilina pygmæa (Egger)..	vr	vr	vr	...	..	...
Bulimina pupoides, d'Orb. ...	vr	vr	vr	..	...	...
B. marginata, d'Orb. ..	vr	..	..	vr	...	..
B. fusiformis, Will. ..	vr	...	vr	..	..	...
B. elegantissima, d'Orb. .	vr	...	vr	...	...	...
Virgulina Schreibersiana, Cz.	...	...	vr	..	..	vr
V. squammigera (d'Orb.) ..	...	...	vr	...	..	.
Bolivina punctata, d'Orb. ...	r	r	r	..	..	...
B. variabilis (Will.) ...	f	f	..	..	...	.
B. textilarioides, Rss. ..	..	..	vr	...	...	...
B. dilatata, Rss. ..	vr	.		...	...	...
B. plicata, d'Orb. ...	c	r	c	vr	vr	vr
B. difformis (Will.) ...	..	..	vr	...	..	...
Cassidulima lævigata, d'Orb....	vr	...	.	vr	vr	...
C. crassa, d'Orb. .	c	r	f	r	r	vr
Lagena globosa (Montag.) ..	vr	vr	..	...	...	..
L. lævis (Montag.) ..	vr	...	..	...	...	.
L. lineata (Will.) .	..	vr	vr	..	...	..
L. sulcata (W. & J.) ...	...	...	vr	...	...	..
L. Williamsoni (Alcock) ...	vr	..	vr	...	..	vr
L. semistriata, Will. ...	vr	vr	vr	vr	...	vr
var strumosa, Rss ...	...	..	vr	...	...	...
L. squamosa (Montag.) ...	vr	...	vr	...	...	vr
L. marginata, W. & B. ...	f	r	f	vr	...	..
L. lucida (Will.) ...	vr	vr	r		...	..
L. clathrata, Br. ...	..	...	vr	...	...	.
L. quadrata (Will.) ...	.	...	vr	...	...	...
L. fasciata (Egger) ..	...	...	vr	...	...	..
L. Orbignyana (Seg.) ..	vr	.	vr	..	...	..
Nodosaria calomorpha, Rss. ...	...	...	vr	...	...	...
N. pyrula, d'Orb. ...	...	..	vr	..	..	...

	Rolled balls of Clay	In Situ.				
LIST OF SPECIES.	Longhurst, Belfast.	Longhurst, Belfast.	Dundonald, Belfast.	Lisburn.	Armagh.	Stranmillis, Belfas Malone Sands
Lingulina carinata, d'Orb.	vr	..	...	...	..	...
Polymorphina gibba, d'Orb.	...	..	vr		...	...
P. lanceolata, Rss.	vr	...	vr	vr	..	...
P. lactea (W. & J.)		..	vr	...	...	..
Uvigerina angulosa, Will.	vr	..	vr	...	..	..
Globigerina bulloides, d'Orb.	c	f	c	f	vr	vr
Orbulina universa, d'Orb.	f	vr	f	vr	..	...
Patellina corrugata, Will.	r	...	vr	...	...	..
Discorbina globularis (d'Orb.)	vr	vr	vr	...	...	..
D. rosacea (d'Orb.) ?	vr	..	vr	.		...
D. nitida (Will.)	...		vr	...	...	..
D. obtusa (d'Orb.)	c	r	c	r	..	vr
D. minutissima, Chaster	vr	vr	vr	...	...	...
D. vesicularis (Lamk.)	...	...	vr	...	...	...
D. Wrightii, Brady ?	vr	..	...		..	...
Truncatulina lobatula (W. & J.)	vr	...	vr	...		...
Pulvinulina auricula (F. & M.)	vr	...	r	...	..	...
P. Patagonica (d'Orb.)	.	..	vr	.	...	...
P. nitidula, Chaster	vr	...	.	..	...	...
P. Karsteni (Rss.)	r	vr	r	...	...	...
Nonionina depressula (W. & J.)	vc	c	vc	c	vr	f
*N. asterizans (F. & M.)	...	...	...		...	...
N. stelligera, d'Orb.	r	...	vr	...	..	..
N. pauperata, B. & W.	...	...	vr	...	..	..
Polystomella crispa (Linné)	...	...		vr	...	...
P. macella (F. & M.)	...	..	vr	...	...	...
P. arctica, P. & J.	r	vr	vr	...	...	vr
P. striato-punctata (F. & M.)	c	vr	c	...	...	vr

NOTE.—*Nonionina asterizans with three other foraminifera were obtained in a gravel pit near the Giant's Ring, Belfast.

"THE APPLICATION OF WATER POWER."

By Mr. John Smyth.

Mr. John Smyth gave an account of the proceedings of the last meeting of the British Association at Leicester, which he attended as a delegate, and read an abstract from a paper which he read before that organisation on "The Application of Water Power, and How to Secure the Greatest Efficiency in its Working."

On the motion of Mr. William Gray, seconded by Rev. R. T. Simpson, a cordial vote of thanks was passed to the gentlemen who had contributed papers, and the proceedings then terminated.

8th April, 1908.

"THE BIRTH AND INFANCY OF PRINTING."

By Dr. Andrew Trimble.

(Abstract.)

The Lecturer, in the course of a very interesting review, said printing was the development of a phase in the evolution of history: it was the offspring of a hungry necessity, and was as certain to come as day was to follow night. At the end of what we were pleased to call the "Dark Ages" there came the Renaissance, and with it the effort to acquire greater knowledge. As knowledge grew, so the desire for its spread increased. The fifteenth century was as productive of brilliancy in thought, in art, in printing, in architecture, and the general outlook on life as our own, and in some respects it was superior. As De Quincey had pointed out, the idea of printing by type was already present in the world, as was shown by the use of coins. But there was the necessity for having a material that would be cheap enough to make it worth while to print copies of any given work. Paper was made and used in China eight centuries before Christ came on earth, whereas the secret of its manufacture was not known in the Western world until eight centuries after Christ. The making of paper slightly preceded the introduction of printing by movable types. Paper was made in Belgium in 1451, and by the end of the 15th century its manufacture was perfectly understood, and the first book printed on English paper was dated 1495. The speaker referred to the first work by printed type, and traced its development. He showed how the first type was made on the same lines as the manuscript letters, and was based on the same

construction. Printing was not intended to take the place entirely of manuscript, but to be a handmaiden to the scribe and to assist him in his labours. Its development was very slow, and for a long time it had to be assisted by manuscript work. Lawrence Costa, who flourished in the 15th century, was the inventor of wooden types, and Guttenburg invented the movable metal types, after many failures and futile attempts. Caxton was the father of English printing, and he was born in the County of Kent in the year 1422. He set up his printing press in the precincts of Westminster Abbey, and printed the first book in English published in England. In all, he printed 64 books, nearly all of which were classical books. It was said by some people that printing was first introduced into Belfast at the time of William the Third, by two printers who accompanied the King to print his proclamations and orders. He (the lecturer) was rather of the opinion that these two men (Patrick Neill and James Blood) came from Glasgow at the invitation of the then Sovereign of Belfast.

On the motion of Mr. John Macarthur, seconded by Mr. H. Riddell, and supported by the Honourable S. Knabenshue, a hearty vote of thanks was passed to the lecturer.

ANNUAL REPORT. 1907-8.

The annual meeting of the shareholders of the Society was held on October 2nd, 1908, in the Belfast Museum, College Square North, Sir Otto Jaffe, LL.D., J.P. (President), occupied the chair, and the attendance included the Right Hon. Robert Young, J.P.; the President of Queen's College (Rev. Dr. Hamilton); Messrs. George Kidd, J.P.; Seaton F. Milligan, M.R.I.A., J.P.; G. W. Ferguson, J.P.; W. Swanston, F.G.S.; John Brown, F.R.S.; John Horner, J. H. Davies, Robert Patterson, M.R.I.A.; Nevin H. Foster, W. Armstrong, W. T. Braithwaite, W. H. F. Patterson, E. H. Clarke, R. A. Kyle, A. T. Jackson, W. Faren, John Macormac, M.D.; S. W. Allworthy, M.D.; W. Gray, M.R.I.A.; Joseph Wright, F.G.S.; J. M. Finnegan, B.A., B.Sc.; Isaac W. Ward, A. H. Muir, and Robert M. Young (hon. secretary).

The HON. SECRETARY, having read the notice convening the meeting, submitted the report of the Council, which stated:—

The Winter Session was opened in the Museum on the 12th November, 1907, when an illustrated lecture was given by Mr. Joseph R. Fisher, B.L.; subject, "Canada in the Twentieth Century."

The Second Meeting was held on the 11th December, when an illustrated lecture was kindly delivered by Mr. R. A. Dawson, A.R.C.A., Head Master, School of Art, Municipal Technical Institute, Belfast; subject, "Celtic Art: Its Development, Characteristics, and Possibilities."

The Third Meeting took place on the 14th January, 1908, when an illustrated lecture was given by Professor Gregg Wilson, D.Sc., M.R.I.A., on "Primitive Australia."

The Fourth Meeting took place on the 11th February, when Professor W. B. Morton, M.A., lectured on "The Scientific Basis of Music," illustrated by a series of experiments.

The Fifth Meeting was held on the 18th March, when the following papers were read:—(1) "The Lessons of History," Rev. J. Rosenzweig; (2) "Foraminifera from the Gravel Pit, Longhurst, Dunmurry, and other localities in the vicinity of Belfast, with a reference to the Malone Sands," Mr. Joseph Wright, F.G.S.; (3) Report as Delegate to British Association, 1907, Mr. John Smyth, M.A.

The concluding Meeting took place on the 7th April, when Councillor Dr. Andrew Trimble, M.B., delivered an illustrated lecture on "The Birth and Infancy of Printing." There was a good attendance of the members and general public at all these meetings.

As is customary, the Museum was opened to the general public on Easter Monday aud Tuesday at a nominal charge, and large numbers availed themselves of the opportunity, no damage being done to the collections. The various societies holding their meetings in the Museum continue to do so. Amongst the donations received during the year may be specially mentioned the collection of Irish birds, botanical specimens, and books, bequeathed by Rev. S. A. Brennan, Rector of Cushendun. Your Council are glad to report that the valuable objects, including the stone coronation chair of the O'Neills, lent to the Irish International Exhibition, were duly returned without damage. They formed an attractive feature, and received much attention on account of their historical interest. Your curator, Mr. John Sinclair, has given every satisfaction since his appointment on the retirement of Mr. S. A. Stewart on 1st May, 1907. The number of valuable publications issued by the various learned societies exchanging their transactions with us show no diminution. Since the last annual meeting the Society has to deplore the death of several of its most esteemed members, including Dr. Henry Murney, J.P.; Messrs. James Wilson, M.E.; L. L. Macassey, B.L., M.I.C.E.; and F. R. Lepper, J.P. Dr. Murney was one of our oldest members, but owing to failing health had not attended any meetings of the Society for some years. Mr. James Wilson

was a valued member of the Council for a number of years, and contributed papers on several occasions. For many years Mr. L. L. Macassey took an active part in furthering the interests of the Society by reading valuable papers and joining in the discussions. With regard to the proposed transfer of the Society's collection to the City Corporation, nothing further has been done since last November, when the Society's replies to the various queries asked by the Library and Technical Instruction Committee were communicated by our President, and your Council are awaiting the reply of the Corporation. Your Council desire to express their best thanks to the local Press for their reports of the various meetings. In accordance with the constitution of the Society, five members of Council retire from office, all of whom are eligible for re-election—viz., S. F. Milligan, J.P.; Sir J. W. Byers, M.A., M.D.; R. Patterson, M.R.I.A.; William Swanston, N. H. Foster.

Mr. John Horner (Hon. Treasurer) presented the financial statement, which showed that the year closed with a debit balance, mainly due to the fact that the buildings required structural alterations and repairs, upon which £35 was expended. It was to be regretted that through death they had lost a number of their members.

The Chairman, in moving the adoption of the annual report and statement of accounts, said they all regretted the deaths which had occurred during the year, and desired to express their sympathy with the bereaved families. He did not remember a single year in which so many of their friends had departed, and he hoped they might not have to record such losses next year. They were indebted to all who had contributed papers in the past year, and they were most interesting, and the attendance was very good on each occasion. In regard to the negotiations for the transfer of the Museum collection, as they were aware, the Corporation wished to have certain details, which they endeavoured to supply, and the outcome was that the Corporation, at the monthly meeting subsequently, had adopted the resolution passed by the

Library and Technical Instruction Committee recommending the striking of a minimum rate of ½d. in the £1. That resolution would give new life to the negotiations. They sincerely hoped it would be for the benefit of the public at large as well as of the members of the Society, and that the arrangements would be carried out in a manner creditable to all concerned. In conclusion, he had to thank the members of the Society for the honour they had paid him by allowing him to be President for a second year.

Rev. Dr. HAMILTON, in seconding, said it seemed to him that the second year of their present President's office had been, if possible, more useful and more important than its predecessor. They had all heard the report of the ordinary proceedings of the Society during the winter, and he thought that these proceedings had been in keeping with their past history, and had reflected credit and honour upon that old association. It had happened before now that the good wine had been kept to the last, and he thought that since their annual report was drafted and passed through the Council an event had occurred which transcended in importance anything which their Hon. Secretary had been able to chronicle during any year of the Society's history. That day's morning papers had told them of the action of the City Council on the previous day with regard to taking over the collection which was housed in the Museum. He did not know what the general opinion of those present was, but he thought most decidedly that the Council had never adopted a wiser resolution than when they decided to strike a rate of ½d. in the £1 for the purpose of increasing the accommodation at the City Museum, and being able to house the collection now at College Square North. It seemed to him that in the interests of the city it was most desirable that they should have an Art Gallery and Museum worthy of Belfast; and, further, that in the interests of science, and especially of natural history—with which that Society had been particularly connected since its origination—it was most important that there should be a proper Museum, adequately fitted up, and able to

accommodate the whole of the natural history collections of the city proper and those that were going to be placed at the disposal of the Corporation. He saw from the report of the Committee of the Corporation that on two points they hardly saw eye to eye with the Council of that Society. In the first place they would have preferred that the collections of the Society should be given, not as a permanent loan, but as a gift; but it seemed to him as an ordinary layman there was little difference, as one was as little capable of revocation as the other. The other point on which a difference seemed to have arisen was as to the continuance of housing their collections in that building. The Curator of the City Museum seemed to hold that it would be better to have all the collections in one place, and he (Dr. Hamilton) thought that any unprejudiced person would agree that that would be an ideal state of affairs, as it would be most undesirable if anyone wanting to study a particular branch of natural history found one specimen in Royal Avenue and another in College Square North, both belonging to the same species. He thought the proceedings of the City Council marked a red-letter day, not only in the history of that Society, but in the history of Belfast, and he trusted that the progress already made would go on unchecked, and that before they met for another annual meeting, that the transfer, or the arrangements for the transfer, would have become an accomplished fact. He thought it well that the public should clearly understand that there were two things they did not propose to part with. They had no idea of parting with that building; it was the property of the Natural History Society, and he hoped the day was far distant when it would cease to be used for scientific purposes. Even when their collection was taken to another place there would be plenty of need for it to accommodate that and other scientific societies, and he thought it would be a pity if Belfast had not such a building for that purpose. It was also to be clearly understood that there was no intention of ceasing the life or history of that Society, which had now behind it an honourable record of nearly a century, and he hoped none of them would

ever live to see the day when it would become a thing of the past. All they meant to do was to transfer on terms mutually agreed upon their collection to the city for safe keeping and more general use.

Mr. William Gray said although they might not agree in every detail, he endorsed most heartily the sentiments and most of the facts to which Dr. Hamilton had referred, and he hoped the project would be for the permanent security and extended usefulness of the Natural History and Philosophical Society. It was a point that he himself had been advocating for many years.

The resolution was adopted.

Mr. William Gray moved the re-election of the outgoing members of the Council. Mr. A. T. Jackson seconded the motion, which was passed. Mr. John Macormac moved, and Mr. G. W. Ferguson seconded, a vote of thanks to the President, which was cordially passed.

EDUCATIONAL ENDOWMENTS (IRELAND) ACT, 1885, 48 & 49 Vict., ch. 78.

The Account of the Belfast Natural History and Philosophical Society for the Year ended 30th April, 1908.

Dr. **Cr.**

CHARGE.		
To Subscriptions		£93 11 0
,, Dividends		17 2 0
,, Rents		26 12 6
,, Fees		0 4 6
,, Realized by Sales		0 5 0
,, Miscellaneous Receipts, viz. :—		
Admissions (12 months)	£19 5 0	
Do. Easter	11 6 10	
		30 11 10
,, Balance		53 6 6
Total		£221 13 4

DISCHARGE.		
By Amounts of Payments under the following headings :—		
Maintenance of Premises, &c.	£35 4 7	
Rent and Taxes, &c.	29 8 2	
Salaries	76 10 0	
		£141 2 9
,, Other Payments, viz. :—		
Printing and Stationery	£16 5 9	
Advertising	4 15 7	
Postage and Carriage	4 15 8	
Fuel and Gas	6 11 6	
Insurance	5 2 3	
Audit	1 1 0	
Lanterns	1 15 0	
Interest	0 17 2	
Easter Expenses	6 2 1	
Other Expenses	1 17 0	49 3 0
Total Payment		190 5 9
,, 1907 Dr. Balance		26 6 2
,, Balance in Accounting Officer's hands		5 1 5
Total		£221 13 4

N.B.—Besides the above Balance there is a Sum of £400 standing to the credit of this Account in the York Street Spinning Co., Ltd., 4½ per Cent. Debenture Stock.

We certify that the above is a true Account.

ROBERT M. YOUNG, Governor.
JOHN HORNER, Accounting Officer.

Dated this 20th day of August, 1908.

I certify that the foregoing Account is correct.
R. J. BAKER, Auditor.

Dated this 22nd day of July, 1908.

DONATIONS TO THE MUSEUM, 1907-08.

From Master Fergus M'K. Graham, Calcutta.

Chinese Tooth Picks, from Hong-Kong.

From Mr. Thomas Edens Osborne.

Papyrus (Egyptian) from Fountain of Arethusa, Syracuse (Sicily), 1907.

From Mr. Joseph Fulton, Transvaal.

A Bull Frog.

From Mr. Andrew Anderson, Castlereagh.

Petrified Wood, from Yellowstone National Park, Wyoming, U.S.A.

From the late Rev. S. A. Brennan, Cushendun.

A Badger pictorially mounted, three young Badgers, a Stag's Head, Saw of a Saw Fish, Snake's Skin, Thirty Stuffed Birds, a large number of Birds. and a collection of Botanical Books, and dried specimens of Plants.

From Mr. Fergus M. Greeves Knock.

A specimen of Nummulitic Limestone, from Mentone (Alpes Maritimes), France.

EXCHANGES.

ADELAIDE.—Transactions of the Royal Society of South Australia.

ALBANY.—Annual Report of the New York State Museum.

AUSTIN.—Transactions of the Texas Academy of Science.

BASEL.—Verhandlungen der Naturforschenden Gesellschaft in Basel.

BELFAST,—Report and Proceedings of the Belfast Naturalist Field Club.

BERGEN.—Bergens Museums Aarbog and Crustacea of Norway.

BOLOGNA.—Rendiconto della R. Accademia dell' Instituto di Bologna.

BOULDER.—University of Colorado College Studies.

BREMEN.—Abhandlungen vom Naturwissenschaftlichen Verein zu Bremen.

BRESLAU.—Zeitschrift für Entomologie vom Verein für Schles sicke Insektenkunde.

BRIGHTON.—Annual Report of Brighton and Hove Natural History and Philosophical Society.

BRISBANE.—Annals of the Queensland Museum.

BROOKLYN.—Science Bulletin of Brooklyn Institute of Arts and Sciences.

BRUSSELS.—Bulletin de la Société Royale de Botanique.

,, Annales de la Société Royale Zoologique et Molacologique de Belgique.

,, Annales de la Société Entomologique de Belgique.

BUENOS AYRES.—Anales del Museo Nacional de Buenos Aires.

BUFFALO.—Bulletin of Buffalo Society of Natural Sciences.

CALCUTTA.—Records of the Geological Survey of India.

,, Memoirs of the Department of Agriculture in India. Botanical series and Entomological series, also the Agricultural Journal of India.

CAMBRIDGE.—Proceedings of Cambridge Philosophical Society.

CAMBRIDGE, MASS.—Bulletin of the Museum of Comparative Zoology, also Curator's Report.

CARDIFF.—Transactions of the Cardiff Naturalists' Society.

„ Report of the Welsh Museum of Natural History.

CASSEL.—Abhandlungen des Vereins fur Naturkunde zu Kassel.

CHRISTIANIA.—Forkandlinger i Videnskabs-Selskabet i Christiania.

CINCINNATI.—Bulletin of the Lloyd Library.

COLORADO SPRINGS.—Colorado College Studies, also Science series and Engineering series.

DANTZIC.—Schriften der Naturforschenden Gelleschaft in Danzig.

DAVENPORT.—Proceedings of the Davenport Academy of Sciences.

DUBLIN.—Scientific Transactions of the Royal Dublin Society, also Scientific Proceedings and Economic Proceedings.

EDINBURGH.—Transactions of the Botanical Society of Edinburgh.

„ Proceedings of the Royal Society of Edinburgh.

„ Proceedings of the Royal Physical Society.

EMDEN.—Jahresbericht der Naturforschenden Gesellschaft in Emden.

GENOA.—Rivista Ligure di Scienze, Letture, ed Arti.

GIESSEN.—Bericht der Oberhessischen Gesellschaft für Natur und Heilkunde zu Giessen.

GLASGOW.—Proceedings of the Royal Philosophical Society.

GORLITZ.—Abhandlungen der Naturforschenden Gesellschaft zu Gorlitz.

HAMBURG.—Verhandlungen des Naturwissenschaftlichen Vereins in Hamburg.

INDIANAPOLIS.—Proceedings of the Indiana Academy of Sciences.

KHARKOW.—Transactions of the Society for Physico Chimiques of Kharkow University.

KIEW.—Memoirs of the Society of Naturalists of Kieff.

LAUSANNE.—Bulletin de la Société Vaudoise des Sciences Naturelles.

LAWRENCE.—Science Bulletin of the University of Kansas.

Leeds.—Annual Report, Philosophical and Literary Society.

Leipsic.—Sitzungberichte des Naturforschenden Gesellschaft zu Leipzig.

Lima.—Boletin del Cuerpo de Ingenieros de Minas del Peru.

London.—Report of the 76th Meeting of the British Association, also Report of the Corresponding Societies Committee.

,, Quarterly Journal of the Geological Society of London.

,, Journal of the Royal Microscopical Society.

,, Transactions of the Zoological Society of London.

,, Memoirs of the Royal Astronomical Society.

,, Guide Books, British Museum (Natural History.)

Madison.—Bulletin and Maps of the Geological and Natural History Survey of Wisconsin.

Madras.—Bulletin of the Madras Government Museum.

Manchester.—Journal of the Manchester Geographical Society.

Melbourne.—Proceedings of the Royal Society of Victoria.

Mexico.—Boletin Mensual del Observatoria Meteorologico Magnetico Central de Mexico, also Anuario.

,, Boletin de Instituto Geologico de Mexico.

Milwaukee.—Bulletin of the Wisconsin Natural History Society.

Minneapolis.—Bulletin of the Minnesota Academy of Natural Sciences.

Missoula.—Bulletin of the University of Montana.

Montevideo.—Anales del Museo Nacional de Montevideo.

Montreal.—Reports and Maps, Geological and Natural History Survey of Canada.

Moscow.—Bulletin of the Imperial Society of Naturalists of Moscow.

New York.—Bulletin of the American Geographical Society.

,, Annals of the New York Academy of Sciences.

Nottingham.—Annual Report and Transactions of the Nottingham Naturalists' Society.

Ottawa.—Annual Report of the Geological Survey.

Padua.—Atti della Accademia Scientifica Veneto-Trentin Istriana.

PHILADELPHIA.—Proceedings of the Philadelphia Academy of Natural Sciences.

„ Proceedings of the American Philosophical Society.

PISA.—Atti della Societa Toscanà di Scienze Naturli.

RIO DE JANEIRO.—Archivos do Museu Nacional do Rio de Janeiro.

ROCHESTER, N.Y.—Proceedings of the Rochester Academy of Science.

ROME.—Journal of the British and American Archæological Society.

„ Atti della Reale Accademia dei Lincei.

„ Bollettino della Societá Zoologica Italiana.

SAN FRANCISCO.—Proceedings of the Californian Academy of Sciences.

STAVANGER.—Aarshefte of Stavanger Museum.

STIRLING.—Transactions of the Stirling Natural History and Archæological Society.

STOCKHOLM.—Kungl Svenska Vetenskaps Academiens Handlingar.

SYDNEY.—Journal of the Royal Anthropological Society of Australasia.

TOKYO.—Mitteilungen der Deutschen Gesellschaft für Natur und Volkerunde Ostasiens.

TRENTON, N.J.—Archæologia Nova Cæsarea.

UPSALA.—Bulletin of the Geological Institute of Upsala University.

VIENNA.—Verhandlungen der Kaiserlich Koniglichen Geologischen Reichsanstalt.

WASHINGTON.—Year Book of the Department of Agriculture.

„ Annual Report of the American Bureau of Ethnology.

„ Annual Report of the Smithsonian Institution, Proceedings of the United States National Museum, Smithsonian Contributions to Knowledge, and Smithsonian Miscellaneous Collections.

„ Bulletin of the Philosophical Sosiety of Washington.

YORK.—Annual Report of Yorkshire Philosophical Society.

ZURICH.—Vierteljahrsschrift der Naturforschenden Gesellschaft in Zurich.

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Herdman, F.S., The Drift, Belfast
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Lytle, Joseph H., J.P., Ashleigh, Windsor Avenue, do.

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Maxwell, David A., College Gardens, do.
Mayes, William, 5 Mount Pleasant, do.
Milligan, A., Springfield Road, do.
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Moore, James, The Finaghy, Belfast
Morton, Professor W. B., M.A., F.R.U.I., Nottinghill, do.
Muir, A. H., Scottish Provident Buildings, do.
Mullan, William, Lindisfarne, Marlborough Park, do.
Murney, Henry, M.D., J.P. (Reps. of), Tudor House, Holywood, Co. Down
*Murphy, Isaac James (Representatives of), Armagh
*Murphy, Joseph John (Representatives of), Belfast
Musgrave, Edgar, Drumglass, Malone, do.
*Musgrave, Henry, Drumglass, Malone, do.
MacAdam, Robert (Representatives of), do.
M'Bride, Henry James, J.P., Hyde Park, Mallusk, do.
M'Bride, Samuel, Edgehill, Lennoxvale, do.

*M'Calmont, Robert (Representatives of), London
*M'Cammon, Thos. P., Plaisted, Woodville, Holywood, Co. Down
M'Cance, Miss Charlotte Georgianna (Representatives of), Larkfield, Dunmurry, Co. Down
MacColl, Hector, Kirkliston Drive, Bloomfield, Belfast
MacCormac, John M., M.D., Victoria Place, do.
M'Cormick, Hugh M'Neile, Cultra House, Holywood, Co. Down
*M'Cracken, Francis (Representatives of)
MacIlwaine, J. H. (Reps. of), Mornington Park, Bangor, do.
M'Kisack, H. L., M.D., University Square, Belfast
*MacLaine, Alexander, J.P., Queen's Elms, do.
M'Neill, George, Beechleigh, Malone Road do.

Neill, Sharman D., Martello Terrace, Holywood, Co. Down
Nicholson, Henry J. (Reps. of), Bedford Street, Belfast

O'Neill, Henry, M.D., B.L., J.P., College Square East, do.
*O'Rorke, Mrs., Dunratho, Craigavad, Co. Down
Orr, Hugh L., Charnwood Avenue, Belfast
Orr, Rev. R. J., Fitzroy Avenue, do.

Park, Rev. Wm., M.A., Garthowen, San Souci Park, do.
Patterson, Edward Ferrar, Ballyholme Road, Bangor, Co. Down
Patterson, David C., Holywood
Patterson, John, Dunallan, Windsor Avenue, Belfast
Patterson, Richard, J.P., Kilmore, Holywood, Co. Down
Patterson, Robert, F.L.S., M.R.I.A., F.Z.S., M.B.O.U., St. Clare, do. do.
Patterson, William H., M.R.I.A., Garranard, Strandtown, Belfast
Patterson, William H. F., Stalheim, Knock, do.
Pim, Edward W., J.P., Elmwood Terrace do.
Pim, Joshua, Slieve-na-Failthe, Whiteabbey, Co. Antrim
Praeger, R. Lloyd, B.E., M.R.I.A., National Library. Dublin

Rea, William R., Abbeylands, Whiteabbey
Reade, Robert H. S., J.P., D.L., Wilmont, Dunmurry, Co. Antrim
Robertson, William, J.P. (Reps. of), Netherleigh, Belfast

Riddell, Henry, B.E., Great Victoria Street, Belfast

Scott, R. Taylor, Richmond Villa, Derryvolgie Avenue, do.
Sheldon, Charles, M.A., D.LIT., Royal Academical Inst., do.
Shillington, Thomas Foulkes, J.P., Dromart, Antrim Road, do.
Simms, Felix Booth, Dunalton, Donaghadee
Sinclair, Right Hon. Thomas, M.A., J.P., D.L., Hopefield, Belfast
Sinclair, Prof. Thomas, M.D., F.R.C.S.E., University Square, do.
Smyth, John, Castleton Terrace, do.
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Symington, Prof. Johnson, M.D., F.R.S.E., Queen's College, do.
Symmers, Professor Wm. St. Clair, M.D. do. do.

*Tennent, Robert (Representatives of), Rushpark, do.
*Tennent, Robert James (Representatives of), Rushpark, do.
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Walkington, Miss Jane A., College Green, do.
Walkington, Thomas R., Edenvale, Strandtown, do.
Wallace, John (Representatives of), do.
Ward, Isaac W., Camden Street, do.
*Webb, Richard T., Kensington Villa, Knock Avenue Road, do.
Whitla, Prof. Sir William, M.D., J.P., College Square North, do.
Wilson, Prof. Gregg, M.A., PH.D., D.SC., M.R.I.A., Queen's Col., do.
Wilson, James, M.E. (Representatives of), do.
Wilson, John, J.P., Donegall Street, do.
*Wilson, Walter H. (Representatives of), Belvoir Park, do.
*Wilson, W. Perceval, do.
*Wolff, W. G., J.P., M.P., The Den, Strandtown, do.
Workman Francis, The Moat, Strandtown, do.

Workman, John, J.P., Lismore, Windsor,	Belfast
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*Workman, Thos., J.P., (Reps. of) Craigdarragh, Craigavad,	do.
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Young, Right Hon. Robert, C.E., J.P., Rathvarna,	do.
*Young, Robert Magill, B.A., J.P., M.R.I.A., Rathvarna,	do.

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Wright, Joseph, F.G.S., Alfred Street,	do.

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Report and Proceedings

OF THE

BELFAST

Natural History and Philosophical Society

FOR THE

SESSION 1908-1909.

BELFAST:
PRINTED BY MAYNE & BOYD, 2 CORPORATION STREET.
(Printers to the University.)

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Belfast Natural History and Philosophical Society.

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ESTABLISHED 1821.

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CONSTITUTION.

The membership of the Society consists of Shareholders in the Museum, Annual Subscribers (Associates), Honorary Members and Honorary Associates.

Shares in the Museum cost £7 each. A holder of one Share pays an annual contribution of ten shillings ; a holder of two Shares (in one certificate) an annual contribution of five shillings ; while a holder of three or more Shares (in one certificate) is exempt from annual payments. Shares on which the annual payment as above are in arrear are liable to forfeiture. The Council retain the right to decline to consolidate two or more share certificates into one certificate.

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The Council elect, from among their own number, a President and other officers of the Society.

Each member has the right of personal attendance at the ordinary lectures of the Society, and has the privilege of introducing two friends for admission to such ; and he has also the right of access to the Museum and Library for himself and family residing under his roof, with the privilege of granting admission orders for inspecting the collections in the Museum to any person not residing in Belfast or within five miles thereof. The session for lectures extends from November to May.

The Museum, College Square North, is open daily for the admission of visitors, for such hours as the Council may from time to time decide ; the charge for admission to non-members is sixpence each. The Curator is in constant attendance, and will take charge of any donation kindly presented to the Museum or Library.

Any further information required may be obtained from the Honorary Secretary.

BELFAST

NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

SESSION 1908-9.

10th November, 1908.

SIR OTTO JAFFE, LL.D., in the Chair.

"THE FOLKLORE OF THE ULSTER CHILD."

BY THE PRESIDENT, SIR JOHN W. BYERS, MA., M.D.

Abstract.

The CHAIRMAN said he was very sorry there was no chain of office associated with the position of president of that Society, for nothing would have given him greater pleasure than on that occasion to hand the chain to their worthy citizen Sir John Byers. He did not believe that the Councll could have nominated a more popular name than that of Sir John Byers. It would be quite out of place for him to say even a word or two about Sir John, for there was hardly anyone better known than himself and his worthy mother. Since that was a literary and scientific society, he was quite certain Dr. Margaret Byers had as much claim to be mentioned there as any other lady in Belfast. With those few remarks he had very much pleasure in figuratively handing the President's chain of office to Sir John Byers.

The PRESIDENT, who was cordially received, then proceeded with his address, in the course of which he said his first duty was to thank the Council of the Society for electing him as president

for the ensuing year. It was a great honour to be placed at the head of a society which for a period of eighty-seven years had kept the lamp of learning burning in Belfast, and had encouraged original research in various directions ; but to him personally, who had spent almost his whole life in the city, the compliment was intensified by the circumstance that he succeeded many of those who were his former teachers, and to whom he owed so much. He proposed that evening, in fulfilment of a promise made there a few years ago, to try to bring before them some features of "The Folklore of the Ulster Child."

Sir John then proceeded to describe many curious customs associated with the birth of children—the supposed influence of the fairies and matters considered lucky or the reverse in reference to infants. He then dealt very fully with the words and phrases applied in Ulster to children, relating many interesting customs, sayings, and old poems. The early methods of teaching young people their "A B C's" and "tasks" were described. After a reference to the wealth of comparative expressions used in Ulster, the lecturer having collected close on two hundred, descriptive of children and adults, a very full account was given of the Ulster children's rhymes, which were classified as follows :—(1) Rhymes that are used chiefly as soporifics, to woo and to encourage sleep ; (2) rhymes employed with the apparent object of defending the children from supposed enemies, but really with the idea of making them remain more restful, and used also to convey vividly what will happen if they are disobedient ; (3) rhymes the object of which is simply to amuse children of a youthful age ; (4) rhymes which the children repeat, and often sing themselves, while playing at their games. Under each of these classes he supplied numerous interesting illustrations. He pointed out that in the North of Ireland the children, as in many other places, were fond of riddles, some of which were in rhyme and very old, and of which many were quoted.

Finally, Sir John Byers urged the importance of studying the folklore of the Northern province in order to acquire an insight into the language, habits, traditional beliefs, popular superstitions,

natural history, philosophy, and peculiarities of its people; and pointed out that owing to the variety of the racial strains met with in the North of Ireland there was an extraordinary wealth of folk-lore in Ulster. Not only did the various immigrants who from time to time came to Ulster bring their language, but they also carried with them their traditions, habits, and customs, and all these, so varied in origin, added to the existing and native Celtic folklore, which was so extremely rich, had accumulated a wonderful profusion of material in the North of Ireland which was well worth the careful study of everyone interested in a subject which threw so much light on the history of the human race.

Mr. W. H. PATTERSON, M.R.I.A., in moving a cordial vote of thanks to Sir John Byers for his most admirable lecture, expressed the hope that it would be published in extenso, and, if possible, with additions sent in by those interested in the subject and possessed of materials.

Mr. E. J. M'KEAN, B.L., in seconding, said the address must have involved a great amount of labour on the part of the President, and it certainly formed a most valuable contribution to the literature of Ulster folklore.

Sir JOHN BYERS briefly acknowledged the compliment, and the proceedings terminated.

8th December, 1908.

Sir John Byers, M.A., M.D., President, in the Chair.

THE GROWTH OF A LEVIATHAN.

By Mr. Edward Wilding.

The Chairman said he believed there was no department in which they would find a better example of the practical application of the most advanced developments of every branch of science than in shipbuilding. It was therefore only natural in a great commercial centre like Belfast, where that industry occupied such a prominent position, that they should have a lecture dealing with the very interesting subject "The Growth of a Leviathan." There were, perhaps, some in that meeting who remembered the launch of the first Oceanic, which was well styled the long Atlantic greyhound, and which revolutionised all previous ideas as to Transatlantic steamers. She was about 465 feet long, she had a single screw, and she also employed sail, and she left Harland & Wolff's establishment thirty-five years ago. The next forward step was in 1889, when the magnificent steamers the Teutonic and Majestic were built. They were about 100 feet longer than the Oceanic, they had twin screws, but abandoned sail. Then, in the gradual evolutionary progress in shipbuilding, came the new or second Oceanic in 1899, with an increase in length over the Majestic and Teutonic of about 100 feet. She was conspicuous for the luxuriance of her fittings and for the adoption of every device to make her passengers comfortable, and to render them forgetful of the fact that they were really in a ship. The introduction of electricity, cold storage, and refrigerating machinery all combined to make the Oceanic a floating hotel. The gentleman who was to address them that night occupied a very responsible and important position on the staff of Harland & Wolff. Mr. Wilding

had the rare privilege of enjoying a hereditary knowledge of ships, for his father was regarded as a perfect cyclopædia on everything pertaining to a ship. Starting with such advantages, he had the valuable opportunity of studying under the distinguished expert Mr. Robert Edmund Froude, F.R.S., superintendent of the Admiralty Experiment Works, Haslar, Gosport, and he was formerly a member of the Royal Corps of Naval Constructors, and was naval architect to the Admiralty. But in addition to having a thorough theoretical and practical knowledge of ship-building, Mr. Wilding possessed the greatest enthusiasm and love for his work, and he (Sir John Byers) was sure all those present would have a most enjoyable treat in hearing his lecture that evening.

Mr. Wilding, who was cordially received, at the outset of his lecture defined a large ship in the restricted sense of the word large, as being one having a tonnage of over 10,000, and the oldest existing ship reaching this size and the newest one—both as for the same owners—were illustrated. A slide of a large cruiser was also shown to illustrate a large vessel for naval service. The cause of the growth in size of ships was explained, and the limitations restraining this growth—the amount of trade and port facilities—were pointed out. The character of the growth for the last sixty years was illustrated, and the extent to which large vessels had been and were being built was dealt with, the share of Belfast in this work being duly indicated, The lecturer explained the way in which the construction of a large vessel began, and gave a general indication of the process followed in the preparation of the design, mentioning the wide area from which materials had to be collected, and the method by which the required quantities of these were ordered. The fashioning of the steel, the handling and preparation of the materials on their arrival at the shipyard, the preparation of the slip, the laying of the keel, the process of riveting, the progress of the structure of the double bottom both in the sheds and on the slip, the erection of the main framing above the tank, the placing in position of the steel decks, the method of construction and the

use of the main watertight bulkheads, the covering of the framework with the shell plating, the erection of the houses forming the super-structure, and the beginning of the woodwork being put on board—all these were dealt with in turn by Mr. Wilding, who afterwards proceeded to speak of the launching of the vessel and to describe the complicated nature of the fitting-out process, illustrating this by reference to the extensive electrical equipment of a large liner, the ventilation, and the arrangements for cooking made on board. After taking his hearers on an imaginary tour round the vessel, the construction of which he had described, and pointing out the various classes of accommodation, Mr. Wilding concluded by speaking of the coaling process, the trials, and finally the departure of the vessel.

MR. JOHN M'CORMICK, in moving a vote of thanks to Mr Wilding, paid an eloquent tribute to the manner in which he had dealt with his subject, and the motion, having been appropriately seconded by Professor Lindsay, was carried with enthusiasm.

26th January, 1909.

MR. WM. SWANSTON, F.G.S., in the Chair.

"THE PRODUCTION AND DETECTION OF ELECTRIC WAVES."

BY MR. JOHN M. FINNEGAN, B.A., B.Sc.

(Abstract.)

MR. FINNEGAN, at the outset, said he assumed the existence of ether, a non-atomic, absolutely continuous medium, without breaks or gaps of any kind, permeating space, the atom superimposed on it, not substituted for it, but probably a definite modification of the ether. The stresses and strains in this medium manifested themselves as electric attraction and repulsion; the short waves were light and heat, and the longer waves were used in wireless telegraphy. All electrical charge and discharge were essentially that of a Leyden jar, and when the coatings of a charged jar were connected by a wire the discharge consisted of a series of decadent electrical oscillations or rushes of electricity along the wire, many reversals and re-reversals of the charges occurring in the exceedingly short period of duration of the spark. The lecturer went on to deal with the phenomena of electric oscillations and the methods of producing these. The manner in which resonance occurred and operated in the sphere of mechanics, sound, and electricity respectively was next referred to, and was followed by a description of electric oscillations in wires, and the nature and production of waves in ether. The lecturer, having lucidly described Hertz's experiments, the slides and experiments shown at this stage being particularly interesting, proceeded to discuss the detection of waves and their application to wireless telegraphy, Having described in detail

the Marconi system, the lecturer said it was in March, 1899, that the first message was sent across the English Channel, and shortly afterwards the Admiralty definitely adopted and installed it. It was now an essential part of the equipment of all large liners, and there had just occurred a notable example of its usefulness in the disaster to the s.s. Republic. Should the historian desire to answer the question to whom should the invention of wireless telegraphy more particularly be attributed, he should certainly first give the name of Hertz, the genius who discovered the waves; then that of Marconi, who was the first to transmit signals by the use of Hertzian undulations; and should also add those of the scholars who, like Morse, Popoff, Sir W. Preece, Lodge, and, above all, Branly, had devised the arrangements necessary for their transmission. But to-day Voltaire's famous apothegm in the "Philosophical Dictionary" was more true than ever. Science becomes more and more impersonal, and she teaches that progress is nearly always due to the united efforts of a crowd of workers, and is thus the best school of social solidarity.

On the motion of Mr. JOHN BROWN, F.R.S., who called attention to the fact that there was no wireless telegraphic apparatus in Belfast, and referred to the drawbacks attendant upon the omission, seconded by Mr. E. J. ELLIOTT, a vote of thanks was warmly accorded to Mr. Finnegan for his lecture, which, as the seconder of the motion said, contained material for a series of lectures.

17th February, 1909.

Sir John W. Byers, M.A., M.D., President, in the Chair,

"BITS OF OLD CHINA."

By Mr. A. M'Monagle,

(*Abstract.*)

The Chairman said Mr. M'Monagle needed no introduction to a Belfast or Ulster audience. He was known to them all in his professional capacity, and those who read his contributions to local journalism would acknowledge his gay wisdom, his kindly humour, and his unique power of balancing the pros and the cons of a question.

Mr. M'Monagle then read his paper on "Bits of Old China," which was a humorous and entertaining dissertation upon some of the characteristics of the "Flowery Land" and its inhabitants. In passing, the essayist made reference to the recent visit of Sir Robert Hart to Belfast, and spoke of the famous administrator as a great statesman and a great Ulsterman—the financial regenerator of China, and one of the most brilliant assets of educated Ireland. After speaking of the immense extent of the Chinese Empire, and the various attempts which had been made by European and other nations to secure a portion of its territory, Mr. M'Monagle said they might talk as much as they liked of the Chinaman's country; they might call him exclusive, ignorant, and unprogressive; they might preach to him about the blessings of Western ideas till they were black or red in the face—he would not move a muscle, or lower an eyebrow, or feel offended, but they must not ask him to do to-day what he could do to-morrow; they must not speak disrespectfully of his

ancestors, and they must not violate any of his laws of etiquette. In his opinion time was made only for slaves and Westerners, and not for Chinamen ; they made time themselves. Their ancestors were practically their gods, and they worshipped them, and they would rather have one honour paid to their ancestors than a dozen to themselves. While they might have much to teach the Chinese in the matter of religion and morals, they might learn much from the Chinese in the matter of politeness and patience. The Chinaman was never rude, never impolite, never in a hurry. He had a code of etiquette for all his public actions and movements, and he lived up to it. He might cheat, but he would do it in such a nice, polite, and innocent way that he would make them feel that he was the one who had been cheated. He had intellectual and ethical codes, which in their own way and in their own sphere were as good as any they had in the West. It was true he did not always live up to his codes or his ideals, but who of them in the West could throw stones at him? The Chinaman was not generally learned himself, but he respects learning. There was one thing which must be said about the Chinaman: While in one grade of him he might cheat at cards or anything else, gamble, or make a beast of himself with opium, the Chinese merchant was the very cream of creation, so far as honour or honesty was concerned. His word was his bond. If he bought goods he would pay for them, and would not invent excuses to get out of his obligations if the market went against him. Such a thing as a written contract was almost unknown in China among the large merchants. Let them do John Chinaman justice, as they would do John Bull, and in this particular John Chinaman was the equal of John Bull at his best, and in saying that he was crediting him with being the superior of all the rest of the world in commercial honour and honesty. It might be asked, Would China Westernise itself, or pour its people in hordes on the West? He did not think so, at least for generations. China was too proud, too conservative, too self-contained and self-satisfied to trouble itself much about the West.

"THE PROBLEM OF TUBERCULOSIS IN THE DAIRYING INDUSTRIES."

By Mr. Alec Wilson.

(*Abstract.*)

Mr. Wilson, in the course of an able and thoughtful lecture, which was rendered additionally interesting by the projection of a number of lantern views illustrating correct dairying methods, said he proposed to accept the verdict carrying the bulk of authority and to take it for granted that tuberculosis is transmissible from cattle to mankind by the medium of milk. If the tuberculin test were to be applied generally in Ireland about 500,000 cows would have to be rejected. A farmer would be likely to lose £4 or £5 on every reacting animal, running the cost into millions and making it a matter for the State. But the taxpayers were hardly likely to approve of a large additional charge for such a purpose, while the abolition of so many animals would wreck the butter trade, because what applied to the milk applied equally to cream and butter; and creamery pasteurisation, so far as the tubercle bacillus was concerned, was in his opinion a pious fraud. Having investigated the matter, he appeared before them that night as a heretic about the tuberculin test, and he submitted that some of the authorities had hugely over-estimated the value of the test as the means of telling whether a given cow was fit to contribute to the milk supply or not. Even if the compulsory universal introduction of the test were both cheap and easy, he doubted if the course were desirable. In fact, he was heretic enough to think the facts suggested the adoption of such a course doing actual harm. Personally, he thought it would be time enough to agitate for the exclusion of reacting cows when proof had been produced that they were an actual danger to the public health, and so far as he could learn, no

such proof had yet been offered of any risk from the cow reacting to the test but clinically healthy. In short, he submitted that the presence of a minute quantity of living tubercle bacilli in the milk of a clinically healthy animal was not a matter to be feared ; the risk of contracting the disease seemed to depend on the size of the dose, and the injection of a small quantity at any one time would rather tend to immunise the person, than to kill him. A feature in the ordinary milk trade that he believed to lie at the bottom of the problem was the common everyday practice of swapping milk from one delivery cart to another. They might know their man and know his farm, and might be sure that both were above suspicion, and yet, when the milk-server was short, he might replenish his stock from an unknown and dangerous source. It would be a most valuable safeguard if the practice were prohibited. He would make it a penal offence to sell milk from a tuberculous udder, and would appoint a veterinary surgeon with a roving commission to examine where he pleased, and free for any farmer in case the latter suspected any of his animals, the diseased cow to be slaughtered on the spot at the cost of the owner. At the most perhaps 2 per cent of the animals would be affected by such regulations. A great need existed in Belfast for the establishment of a dairy where every known precaution would be taken, almost regardless of cost, to insure the scientific purity of its milk. If the medical profession wished for such milk in their treatment of disease they might select a milk committee from their number, who would draw up rules and approach either an individual cow-keeper or the Dairymen's Association, guarantee a certain demand at a named price, and select a suitable farm. The doctors could insure a constant demand, for in the ordinary course of their practice they could prescribe that particular milk. There were two sides to the problem of how to deal with the scourge of tuberculosis, one being the matter he had considered that night, the proper way of checking infection from milk under normal conditions, and the other being the method of dealing with existing illnesses.

The Chairman said they were all greatly indebted to Mr.

Wilson for his interesting paper. He had attempted successfully to solve one portion of a very difficult problem by showing them how they could get milk as pure as it left the udder of the cow without contamination in transmission from the dairy to the consumer ; but he should go a step further, and give them milk that had no suspicion whatever of having the tubercle bacillus in it. If that were done, the whole problem would be solved at once.

Professor LINDSAY, in moving a vote of thanks to Mr. M'Monagle and Mr. Wilson, said the paper contributed by the former had been much enjoyed by everyone in the room. The subject dealt with by the latter was rather tempting in the way of criticism, and they would agree that he deserved the greatest possible credit for setting a high standard in the matter of providing a pure milk supply.

23rd March, 1909.

Sir John W. Byers, M.A., M.D., President, in the Chair.

"THE ECONOMIC ASPECTS OF INTERNATIONAL EXCHANGE."

By E. J. Elliott.

(*Abstract.*)

Mr. E. J. Elliott, in introducing the discussion, said the tendency at present was not to consider this international exchange from the academic or theoretic standpoint, but from the severely practical point of view. In a word, the study of such subjects had passed from the doctrinaire and the theorist to that much-quoted individual, the "man in the street." Hence it was that, while in the eighteenth and part of the nineteenth century political economy was written about and discussed by persons far removed from the practical spheres of life as Adam Smith, Hume, Ricardo, Mill, and others, at the present time those who were most interested, and whose views had most weight, were practical men of affairs, such as prominent business men and statesmen, who had identified themselves not with theories, but with the practical aspect of financial and fiscal questions. The modern and popular treatment of the subject was therefore practical and empirical, not theoretical or speculative. The expression "free trade" could not be properly applied to any system of exchange of commodities that had ever existed in this planet. Free trade, or, as the French called it, "free exchange," involved absolutely free imports and absolutely free exports. If the entire world were

under the control of one Government this condition of things might be considered as possible, but not otherwise. Instead of this free trade we had not in this country even free imports, since no less than twenty-six million pounds sterling per year was raised by duties on imported goods for revenue purposes. It was estimated that the inhabitants of this country paid as much as 15s 9½d per head per year in the shape of customs duties, while the people of the United States paid 14s 11½d per head, and the German people 10s 6d per head. The system to which a number of people in this country were still very much attached was, therefore, a system of partly free and partly taxed imports, with of course exports taxed in all directions. At one time the British system had a good many admirers in different countries, but at present their number was diminishing rapidly. If they went back to the beginnings of trade in this country they would see it was probably at the time of the Hanseatic League, and from that time until the middle of the nineteenth century this country possessed a general tariff, and the rise and progress of the British Empire was coincident with that tariff, because they must admit that at the year 1846 this country was the first in the world in industries and in the diffusion of material wealth. Not only so, but at that time we had become the great maritime Power of the world, having wrested the commercial supremacy of the seas from Holland. The abolition of the general tariff began in 1846, and from that time until 1872 we had great prosperity in this country, which had been attributed to the fact that we had free imports. But it had been admitted by many prominent free traders like Mr. Fawcett and the late Duke of Devonshire that the great expansion of our trade and commerce in these years was largely owing to railway and steamboat development as well as to the development of machinery driven by steam power, such as the power loom and the spinning jenny, the discovery of gold in California and Australia, and, finally, to the freedom from invasion during the time of the Napoleonic wars. It was possible that we prospered under free imports of manufactured goods for a considerable time as long as we were the great manufacturing country

of the world, but after a period of twenty-five years things began to change, and instead of foreign countries sending us raw material and manufactured goods that we could not very well make ourselves they began to manufacture all classes of commodities, with the result that our manufacturing position had been seriously imperilled and large numbers of our workers unemployed. In fact, the predictions of the early free traders had been falsified, and instead of paying for our imports of food and raw material by manufactured goods we had been paying more and more for foreign-manufactured goods by raw material, such as coal. During the year 1907 our unemployed showed a percentage of 4.2 against 1.5 in Germany, and for the six months of 1908 our percentage was 7.2, against 2.6 in Germany. In the United States in 1906 it was stated in Whittaker's Almanac that there were no unemployed among the native population that were capable or willing to work, and that a million and a quarter of immigrants were received into the country and given work. In 1907 there was a financial panic, and it was said that the number of unemployed was large, but this large percentage was arrived at owing to the fact that work was stopped in consequence of the state of the money market acting on various industries; and, further, in estimating the amount of unemployed all persons of both sexes over ten years of age were counted. At present they had not the figures for 1908, but all the evidence went to show that employment was good at present, and that the country had recovered rapidly, and is in a prosperous state. In this country not only were there a large number of unemployed, but in the year 1907 250,000 emigrants embarked for foreign countries to improve their condition, and all the countries they went to were in possession of general tariffs. At the same time only 25,000 emigrants left Germany, a country which, according to free trade predictions, should have been ruined long ago.

Mr. Elliott then referred to the decline of some of our industries, notably the iron and steel industry, in which we had lost the pre eminence, and now only stood third, the United States being first, and Germany second. It was also shown that

even in the shipping industry we had not advanced so much as some other tariff countries, such as Germany, Italy, and Japan. The speaker proceeded to argue that the possession of a general tariff in this country would, first, enable us to produce goods on a footing of equality with manufactures from other countries which were stimulated or assisted by bounties, trusts, or cartels ; second, it would help to stop the dumping of the surplus production of Europe and America at prices under cost, but which it paid the producers to dispose of in this way to a non-tariff country, seeing that it enabled them to produce in quantity and keep their works going full time, and thus have a net gain although selling a portion under cost ; third, it would enable us to have a powerful voice in the settlement of every tariff arrangement with foreign countries, which we do not at present enjoy owing to our system of having nothing on which we can negotiate ; fourth, it would broaden the basis of our taxation, without imposing any extra burden on the poor or working class consumer, since more could be taken off such articles as tea, coffee, cocoa, sugar, and tobacco than would be imposed on the other necessities of life, and in this way the working man would stand to gain immensely as a producer, seeing that he would have regular and constant work at probably better wages, and also as a consumer, since his food would cost him no more, but very probably less ; fifth, it would enable us to form a commercial bond of union with our colonies, and so stimulate trade to and from these countries. They had proved beyond doubt by their preferences, which they had given us, their desire to improve their trade relations with us. All they asked in exchange was some small advantage over the foreigner, who gave us no concession, and who frequently showed his unfriendliness and his disregard of our interests. It was urged that by rearranging our tariff system we could achieve all these desirable ends, rendering our workers, manufacturers, and merchants more prosperous without inflicting hardship on anyone, and, while at the same time we could make our empire more homogeneous and more self-sufficing, we would not be depending on the foreigner, as we were at present, for about one half of our foodstuffs.

Mr. John Sinclair, following Mr. Elliott, said it seemed almost impossible for the tariff reformer to convert the free trader or for the latter to convert the tariff reformer. It seemed strange that those gentlemen who had adopted tariff reform were still unable to give any reason for their faith except the mere prophecy of the millennium that would follow its adoption, while at the same time they condemned Cobden in every mood and tense because, forsooth, his prophecies had not come true. Those who condemned prophecy should themselves be very careful how they engaged in it. Since the repeal of the Corn Laws his belief was that the prosperity of the country had gone up by leaps and bounds ; so much so that last year we had reached record figures. Why should they object to the prosperity of other lands ? Why should they object to the German workers being well clothed and fed ? The more he had to spend the better probably would it be for the people in the United Kingdom. The largest customer for Belfast yarns was Germany, which imported more linen yarns than any other two countries. Then, the United States was their largest customer for linen goods, and it was not too much to say that scarcely any American order went to the Continent until Belfast had refused it. Their Belfast factories were at present as full as they could be, and, although the spinners had not yet been able to get rid of their surplus stocks, that also was coming, and before long they would have a period of prosperity in this city the like of which they had not experienced for some time. Mr. Elliott had referred to Germany and the United States as examples of the benefits derived from protection, but as a matter of fact the latter did not pay its way ; every year there was a deficit in its income as compared with its expenditure. It should also be remembered that because of its vast area there was no possibility of direct taxation in the United States ; they must put on some kind of tariff, and if they chose to make that a high tariff instead of a low one it was their own lookout. Whatever might be said to the contrary, he contended that this was a free trade country because the commodities on which duties were paid were mostly luxuries. The difficulty about the tariff reform movement was

that neither Mr. Chamberlain nor any of his followers had yet put pencil to paper to let them know exactly what was meant by it; it was a thing they could not touch, it eluded them in every direction, and every one was in the habit of referring to it merely as a general tariff. No one had yet put down a list of the commodities that it was proposed to tax. If they wanted to convert the country to a new state of things they should let the people know exactly what the tariff was to be upon—which articles were to be barred and which not. In his opinion the bedrock of taxation should be for revenue purposes and not for the protection of any particular trade or industry. This should not be a party question, but unfortunately it seemed to be drifting into that. At the present time they had a so-called Unionist party in the country, and for good or ill that party appeared to have taken tariff reform almost entirely under its own control. It was a curious thing that the Unionist members of Parliament for the North of Ireland, with two exceptions—Mr. Wolff and Mr. Clark—were ardent advocates of tariff reform. If they wanted tariff reform the best and quickest way for them to get it was to become Home Rulers. The Home Rule party in Ireland would certainly give them protection in its most drastic form. With Home Rule three-fourths of their representatives would be either farmers or farmers' nominees. Everything they needed for manufactures would then be taxed to such an extent that manufactures would at once die in this country. Foreign countries were not the paradises that Mr. Elliott had tried to make out. The standard of comfort in this country was wonderfully high, and if the working men would not spend so much on football matches, boxing competitions, tobacco, and so on they would not have much cause to grumble.

Mr. J. R. Fisher, B.L., editor of the "Northern Whig," said he thought they could congratulate themselves on at least one point, and that was that they could discuss this matter in an Irish atmosphere, outside the bounds of party politics. He had no intention of following up Mr. Elliott or Mr. Sinclair in what they had said, but he should like to speak, apart from the business

interests of any one class or town—to speak from the experience one gained in going a little about the world, and from this he would try to form a conclusion as to what was best for the people as a whole, without regard to the interests of this or that class or form of employment. Mr. Elliott very properly made the points he did about the food and clothing of the German people, because they were absolutely destructive of Mr. Cobden's point of view. Mr. Cobden and others constantly insisted that if foreign countries adopted protection they would ruin themselves; therefore Mr. Elliott brought forward these matters, not in any spirit of envy or jealousy, but to prove that Mr. Cobden's prophecy had not been fulfilled. Personally he (the speaker) was brought up in the strictest and straightest sect of Cobdenism, and was taught that this policy was beyond argument. Morley's "Life of Cobden" was the book, above all others, that first shook his belief in Cobdenism, because he there discovered that it was not a matter of free imports simply. It was built up, in the first place, on universal peace; it was built up on the belief that wars would cease; above all, it was built up on the belief of industrial freedom. Cobden was a strong opponent of trade unions and factory legislation, and the introduction of trades unions and factory legislation had utterly upset the whole balance on which Cobdenism was based. In Morley's "Life" they would find Cobden's abhorrence of anything like interference between the employer and his workmen. Trades unions must be put down, and anything like industrial legislation was bitterly and even malignantly opposed by him and his friends. What was the whole basis of Cobdenism? Cobden wished to break down the system of protection which the landowners of England had built up for themselves. He wanted to get free imports, which would cheapen labour, and he believed that England would then become the workshop of the world. Other countries said—"We want to manufacture, too," and they had taken advantage of that law which John Stuart Mill admitted, the law of exceptions. Mill pointed out that there might be certain manufactures which were indispensable to the existence of a nation, and that those manu-

factures the nation was bound to protect and preserve. Take the question of ships and guns. Suppose some ingenious German were to go to Mr. M'Kenna and offer to supply him with ships and guns at half their cost. Would the head of the British Admiralty accept the offer? Would he not rather say, "Ships and guns are meant for fighting, and we ourselves must keep up the manufacture of them, because the moment the fighting came the supply might be stopped if we depended on you?" The same argument applied to our food supply. There might be brought about such a combination of our foreign enemies as to cause our food supply to be cut off. Therefore he urged that we should even pay more for our food, if the circumstances warranted it, in order to ensure the supply at a time when it was most needed. We had also to consider the question of Imperial unity. He thought at a time like this it was of importance that we should make it worth while for the various parts of the Empire to adhere to the Empire rather than to other countries. There was another phase of the question—that was the desirability of retaining the rural population at home. Could it be disputed that free trade had cut down the population of Ireland to nearly one half? It was all very well to pile up imports and exports and manufactures and manufacturers' wealth, but if we were losing the rural population, upon which the stability of every country must be based, we were not in a healthy state.

Mr. Henry Riddell and Mr. W. Hunter also took part in the discussion, which was adjourned to a date to be arranged by the Committee.

The adjourned meeting was held on 27th April, 1909, when the following gentlemen continued the discussion:—Messrs. J. Mackie, J.P.; W. Armstrong, John Workman, J.P.; G. H. Fulton, John Horner, J. C. M'Clung, A. W. Metcalfe, and John Malone.

The Chairman said the two nights' discussion they had enjoyed had been illuminating and interesting. It had to be admitted that the education given in Germany gave that country

a tremendous advantage, and in Belfast, whether they had a Faculty of Commerce or not in the new University, there must be a correlation between the Technical Institute and the University, some arrangement being come to by which industries would be protected by education.

Mr. Mackie having replied to the various speakers, the meeting concluded with a vote of thanks to the Chairman.

ANNUAL REPORT. 1908-9.

The annual meeting of the shareholders of the Belfast Natural History and Philosophical Society was held on 24th September, 1909, in the Museum, College Square North. The President (Sir John W. Byers, M.D.) occupied the chair, and amongst those present were—The Right Hon. Robert Young, J.P.; Sir James Henderson, D.L.; Sir Otto Jaffe, LL.D.; Messrs. G. W. Ferguson, J.P.; W. Gray, M.R.I.A.; A. C. Muir, John Carson; John Smyth, C.E.; Isaac W. Ward, W. T. Braithwaite; Joseph Wright, F.G.S.; A. Speers, B.A.; Robert Patterson, F.L.S.; Nevin H. Foster; W. H. Patterson, M.R.I.A.; E. H. Clarke; Henry Riddell, M.E.; E. J. Elliott; John Finnegan, B.Sc.; A. T. Jackson, William Faren, John Horner (hon. treasurer), and Robert M. Young, M.R.I.A. (hon. secretary).

The Annual Report was read by the Honorary Secretary as follows:—

The Council of the Belfast Natural History and Philosophical Society desire to submit their report of the working of the Society during the past year.

The Winter Session was opened in the Museum on the 10th November, 1908, when an inaugural address was given by the President, Sir John W. Byers, M.A., M.D.; subject, "The Folklore of the Ulster Child."

The second meeting was held on the 8th December, when Mr. Ed. Wilding lectured on "The Growth of a Leviathan," illustrated by special lantern slides.

The third meeting took place on the 26th January, 1909, when a lecture was given by Mr. John M. Finnegan, B.A., B.Sc.; subject, "Production and Detection of Electric Waves," with experiments and lantern illustrations.

The fourth meeting was held on the 17th February, when two papers were read: I, "The Problem of Tuberculosis in the Dairying Industries" (with lantern illustrations), by Mr. Alec. Wilson; II, "Bits of Old China," by Mr. Alexander M'Monagle.

At the fifth meeting on the 23rd March, Mr. E J. Elliott opened a discussion on "The Economic Aspects of International Exchange," in which several members and friends took part. It was adjourned till the 27th April, when it was concluded after an interesting debate, of which a full report was published by the local Press.

There were large and appreciative audiences at all these meetings.

The Museum, as usual, was opened to the general public on Easter Monday and Tuesday, at a nominal charge.

The different Scientific Societies holding their meetings in the Museum, have continued to do so, with the exception of the Ulster Photographic Society.

Since the last annual meeting the Society has to deplore the loss of one of its most esteemed members, Mr. John H. Davies. He became a member in 1888, and was elected on the Council in 1898, and soon afterwards Hon. Librarian. His scientific knowledge, especially of botany, was always freely at the disposal of the Society, and he contributed several valuable papers to our proceedings.

With regard to the proposed transfer of the collections of the Society to the Belfast Corporation, as mentioned in the last Annual Report, your Council have consulted with Sir Chas. H. Brett, legal adviser to the Society. Acting on his advice two special meetings of Council, and a special meeting of the Society have been held, and have passed a resolution authorising the Council of the Society to make application to the Commissioners of Charitable Donations and Bequests for Ireland for powers (with the consent of the Society) to transfer the collections to the Corporation, on a basis satisfactory to both parties.

Your Council desire to express their hearty thanks to the local Press for their satisfactory reports of the public meetings held.

Our Curator, Mr. John Sinclair, reports as follows :—

The collections in the Museum have received a great amount of attention during the past year, much time being occupied in re-labelling and cleaning the specimens.

The number of visitors to the Museum during the past year show a slight decrease, several of the visitors interested in scientific pursuits, after viewing the Museum, expressed their pleasure at seeing such a valuable collection housed and cared for by the Society. One visitor, Mr. Frederick Watson, M.D., Australian Club, Sydney, marking his approval of what he had seen, and the care bestowed on the collections by generously leaving a donation of one guinea for the Society.

The Stewart Botanical Collection being put up in loose sheets, has been taken to Dublin, where it is to be mounted, and when returned to Belfast will be more accessible to those wishing to consult it and be of greater botanical value than in its former state.

The important set of County Down Graptolites have been returned by Prof. Lapworth, F.R.S., who has kindly re-named and classified them, thus making them a standard collection of the Irish species of these ancient fossils.

The Inter-Basaltic fossil plants have been sent to Dr. C. E. Moss, Botany School, Cambridge, who has very kindly offered to revise and name them.

Mr. Robert Hart Maze, Belfast, has loaned to the Museum two valuable Chinese Porcelain Vases of the Emperor Kien Lung period (1736-1796) with some enamel ware, same period, and other valuable curios brought from China by himself.

In accordance with the constitution of the Society five members of Council retire from office, of whom, four, are eligible for re-election : — Prof. J. Symington, F.R.S.; Rev. Thomas Hamilton, D.D., LL.D. ; Prof. J. A. Lindsay, M.A. ; Sir Otto Jaffé, J.P.; Robert M. Young, J.P.

Mr. John Horner presented the financial statement, and compared the receipts from all sources for the past year with those received in 1900. There was a decrease in the different items, but their ordinary shareholders had subscribed more during the past year than they did in 1900.

The President said he had pleasure in moving the adoption of the report, which showed that the Belfast Natural History and Philosophical Society, which, he understood, was one of the oldest provincial societies in the three kingdoms as regards natural history—this was its eighty-eighth year of existence—was continuing its good work. The last session was not surpassed by any of its predecessors as regards variety of subjects brought forward, interest taken by the public in their proceedings as shown by their attendance, and as regards the very informing discussions at their meetings. Their very efficient curator—Mr. John Sinclair—was devoting great attention to keep their valuable museum collections in proper condition, and to have them labelled correctly, while some of their special collections—botanical and palæontological—had been, or were being, remounted, classified, and revised by well-known specialists in Dublin, Birmingham, and Cambridge. Their Society had suffered a great loss in the sudden death of Mr. J. H. Davies, who frequently brought before the members important observations on botanical subjects, of which he had an intimate practical knowledge. The most important portion of the report was that referring to the proposed transfer of the collections of the Society to their City Corporation. As they were doubtless aware, a deputation from that Society waited upon the Library and Technical Instruction Committee in 1907, and offered their entire collections and specimens in the Belfast Museum, with the cases containing them, to the Corporation on loan. As a result, on the advice of the Library and Technical Instruction Committee, the City Council at the beginning of this year adopted that part of the Museums and Gymnasiums Act (1891) which relates to museums, and struck a rate of ½d in the £, which would yield £2,900 on the present valuation, with the view of amalgamating the Society's collection with their municipal collection, and steps were being at

present taken to arrange for the provision of museum buildings worthy of the city in which the joint collections will find a home. Now, in order that their Society could officially place their collection at the disposal of the Corporation, it was necessary that they should comply with certain legal formalities, and, as a result, the following resolution has been passed at the special meetings of the Society's Council, and at a special meeting of the Society held for the purpose that afternoon :—" That an arrangement having now been come to between this Society and the Belfast Corporation, whereby it is agreed that this Society shall transfer to the Belfast Corporation all this Society's present and future collections and specimens and the cases containing the same, with a view to the amalgamation of the same with the municipal collection, and that as the Society have no power under their scheme to dispose of the Society's collections in the manner aforesaid, the Council of the Society be, and they are hereby authorised to make application to the Commissioners of Charitable Donations and Bequests for Ireland, under article 34 of the Society's scheme, that the Society's scheme be altered by the addition of the following words at the end of clause 13 of the said scheme, or for such other alteration in the said scheme as the Commissioners of Charitable Donations and Bequests for Ireland shall deem expedient, viz. :—" With power to the Council, with the consent of the Society, to transfer, either permanently or upon temporary loan, to the Corporation of the city of Belfast, upon such terms as the Council shall think fit, the whole or any part of the collections and specimens and the cases containing the same now belonging to or which may hereafter be acquired by the Society." When this transfer was completed he (Sir John Byers) believed it would be of the greatest advantage to the Belfast City Council, the Belfast Natural History and Philosophical Society, and, above all, to the public. The Belfast Corporation, through the Library and Technical Instruction Committee, which was doing such splendid educational work under the chairmanship of their good friend Sir James Henderson, would obtain a unique collection of natural history specimens, which had taken years to accumulate, and which,

when housed in a suitable museum, would be of the greatest scientific value to the people of their city and province for all times. On the other hand, when the specimens were removed, the Belfast Natural History and Philosophical Society could increase their finances by letting the present museum, the additional revenue being spent absolutely and entirely on scientific objects (as they were obliged by their trust), such as bringing able lecturers to address them, or in any other manner that their trust scheme allowed, and in this way the public would again be the gainers. In the meantime until the new museum was got ready they would be quite prepared to allow the Corporation to have the use of the old museum, with the specimens, on terms to be mutually arranged. In conclusion, Sir John Byers thanked the Press for the admirable reports they gave of their meetings, and he said that old Society was deeply indebted to Mr. R. M. Young and Mr. John Horner, their honorary secretary and honorary treasurer, both of whom were doing such splendid public work for the community, and who in that respect were each following in the footsteps of their fathers, who were among Belfast's most respected and gifted citizens, one of whom, the Right Hon. Robert Young, they were pleased to see with them on that occasion.

Sir James Henderson, in seconding the resolution, said it would be a great loss to the community if that Society were extinguished. They would be delighted when they got their new Museum erected to have lectures delivered in it the same way as they were in that building. They were a feature of the Society, and he hoped they would not be discontinued, even when the collections and specimens had passed into the hands of the ratepayers. He was particularly gratified that the transfer to the Corporation should take place during his period of office as chairman of the Library and Technical Instruction Committee. He had been an admirer of that Museum from his earliest days, and he trusted that the ratepayers, when they got possession, would appreciate it as much as some of those present did when they were young. In regard to that transfer, he thought everything had been done in a legal way

to make it complete, and the next step was to get the permission of the Commissioners of Charitable Donations. He did not think there would be any difficulty in obtaining their sanction when it was pointed out to them that the transfer was in the interests of the community. They were now on the look out for a site for their new building, and in that connection he might refer to the valuable assistance of Mr. Horner, who was one of the co-opted members of the Technical Committee, and who was always present when hard work had to be done. They had already advertised for a site, but he was afraid there would be some difficulty in securing a suitable one, as, owing to the rapid growth of the city, all the most desirable sites seemed to have been appropriated. He need scarcely say that they considered they were entitled to give their Museum and Art Gallery as good a position as possible, and if sufficient space was not available at the rear of their present Library they would, of course, have to look elsewhere. Perhaps he might say, if there was any person with sufficient land who would present them with a suitable site, they would be delighted to accept it, and to thank him for his generosity. On many occasions Belfast people had done a great deal for the city, and a good example had been set by the late Sir Robert Lloyd Patterson, who had presented them with a fine collection of pictures, together with a cheque for £6,000. Indeed, it was that gift that suggested the idea of erecting another building for their municipal Art Gallery and Museum.

The resolution was carried unanimously.

On the motion of Mr. William Gray, seconded by Mr. Seaton F. Milligan, the following were elected members of the Council :—The Vice-Chancellor of Queen's University (Rev. Dr. Hamilton) ; Sir Otto Jaffé, LL.D.; Professor Lindsay, M.D. ; Mr. R. M. Young, J.P. ; and Mr. Henry Riddell, M.E.

The proceedings concluded with a vote of thanks to the President, moved by Mr. W. H. Patterson, and seconded by Mr. W. T. Braithwaite.

Subsequently a meeting of the Council of the Society was

held, at which the following appointments were made:—President, Sir John W. Byers, M.A., M.D.; Vice-Presidents, Rev. Dr. Hamilton (vice-chancellor of Queen's University); Sir Otto Jaffé, LL.D.; Mr. Robert Paterson, F.L.S.; and Mr. William Swanston; Hon. Treasurer, Mr. John Horner; Hon. Librarian, Professor J. A. Lindsay, M.A., M.D.; Hon. Secretary, Mr. R. M. Young, B.A., M.R.I.A.

EDUCATIONAL ENDOWMENTS (IRELAND) ACT, 1885, 48 & 49 Vict., ch. 78.

The Account of the Council of the Belfast Natural History and Philosophical Society for the Year ended 30th April, 1909.

Dr. — Cr.

CHARGE.

To Balance as per last Account				£5 1 5
,, Subscriptions				92 17 0
,, Dividends				17 2 0
,, Rents				25 9 0
,, Fees				0 9 0
,, Realized from Sales,				0 8 8
,, Miscellaneous Receipts, viz.:—				
Admissions to Museum—				
General, June 1st, 1908, to 31st May, 1909,	£12 12 9			
Easter	7 5 6			
				19 18 0
,, Balance per Bank Book,				72 17 8
Total,				£234 2 9

DISCHARGE.

By Balance per Bank Book		£53 6 6
,, Amount of Payments under the following headings:—		
Maintenance of Premises	£18 9 7	
Rent and Taxes, &c.	28 18 9	
Salaries	71 8 0	
		118 16 4
,, Other Payments, viz.:—		
Printing	£28 4 6	
Advertising	4 3 4	
Postage and Carriage	5 1 6	
Fuel and Gas	5 17 11	
		43 7 3
Insurance	£7 5 3	
Audit	1 1 0	
Easter Expenses	7 2 6	
Interest	2 19 9	
Cheques	0 4 2	
		18 12 8
Total		234 2 9

N.B.—Besides the above Balance there is a Sum of £400 standing to the credit of this Account in the York Street Flax Spinning Co., Ltd., 4½ per cent. Debenture Stock.

We certify that the above is a true Account.

ROBERT M. YOUNG, Governor.
JOHN HORNER, Accounting Officer.
Dated this 14th day of July, 1909.

I certify that the foregoing Account is correct.

RICHARD GRUBB, Auditor.
28th day of July, 1909.

EXCHANGES.

ADELAIDE.—Transactions of the Royal Society of South Australia.

ALBANY.—Annual Report of New York State Museum.

AUSTIN.—Transactions of the Texas Academy of Science.

BASEL.—Verhandlungen der Naturforschenden Gasellschaft in Basel.

BELFAST.—Report and Proceedings of the Belfast Naturalist Field Club.

BERGEN.—Bergens Museums Aarbog and Crustacea of Norway.

BOLOGNA.—Rendiconto della R. Accademia dell' Instituto di Bologna.

BOULDER.—University of Colorado College Studies.

BREMEN.—Abhandlungen vom Naturwissenschaftlichen Verein zu Bremen.

BRESLAU.—Zeitschrift für Entomologie vom Verein für Schlessicke Insektenkunde.

BRIGHTON.—Annual Report of Brighton and Hove Natural History and Philosophical Society.

BRISBANE.—Annals of the Queensland Museum.

BROOKLYN.—Science Bulletin of Brooklyn Institute of Arts and Sciences.

BRUSSELS.—Bulletin de la Société Royale de Botanique.

,, Annales de la Société Royale Zoologique et Molacologique de Belgique.

,, Annales de la Société Entomologique de Belgique.

BUENOS AYRES.—Anales del Museo Nacional de Buenos Aires.

BUFFALO.—Bulletin of Buffalo Society of Natural Sciences.

CALCUTTA.—Records of the Geological Survey of India.

,, Memoirs of the Department of Agriculture in India. Botanical series and Entomological series, also the Agricultural Journal of India.

CAMBRIDGE.—Proceedings of Cambridge Philosophical Society

CAMBRIDGE, MASS.—Bulletin of the Museum of Comparative Zoology, also Curator's Report.

CARDIFF.—Transactions of the Cardiff Naturalists' Society.

„ Report of the Welsh Meseum of Natural History.

CASSELL.—Abhandlungen des Vereins fur Naturkunde zu Kassel.

CHRISTIANIA.—Forkandlinger i Videnskabs-Selskabet i Christiania.

CINCINNATI.—Bulletin of the Lloyd Library.

COLORADO SPRINGS.—Colorado College Studies, also Science series and Engineering series.

DANTZIC.—Schriften der Naturforschenden Gelleschaft in Danzig.

DAVENPORT.—Proceedings of the Davenport Academy of Sciences.

DUBLIN.—Scientific Transactions of the Royal Dublin Society, also Scientific Proceedings and Economic Proceedings.

EDINBURGH.—Transactions of the Botanical Society of Edinburgh.

„ Proceedings of the Royal Society of Edinburgh.

„ Proceedings of the Royal Physical Society.

EMDEN.—Jahresbericht der Naturforschenden Gesellschaft in Emden.

GENOA.—Rivista Ligure di Scienze, Letture, ed Arti.

GIESSEN.—Bericht der Oberhessischen Gesellschaft für Natur und Heilkunde zu Giessen.

GLASGOW.—Proceedings of the Royal Philosophical Society.

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